Emacs Lisp Kh$k%W%m%0%i%_%s%0

=i?4<TN?aNF~Lg

Emacs Lisp Kh$k%W%m%0%i%_%s%0

=i?4<TN?aNF~Lg

Edition 1.04, 2 October 1995

F|K\8lHG 0.9, 19 September 1996

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Published by the Free Software Foundation, Inc.
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=xJ8

GNU Emacs $H$$$&%(%G%#%?$OBgItJ,$, Emacs Lisp $H8F$Plk%W%m%0%i%_%s%08@8l$G=q$+lF$$$k!#$3
%W%m%0%i%_%s%08@8lNCfK=q$+$l$F$$$k%3!<%I$O!"7W;;5!$,%3%^%s%I$,M?$(il$?;~2?$r9Y$-$+$r65$($
%&%'%" — L?Na$N=8$j — G"$k!# Emacs O"J?$, Emacs Lisp $G?7$7$$%3!<%I$r=q$-!"4JC1$K3HD%5!G=$H
$F%($G%#%?$KAH9~$`3H$,=PMh$kh&@_7W5l$F$$$k!#3l$, Emacs $,!vextensible editor (3HD%2DG=%(%G
%?)!W$H8F$Plk=j0JG"$k!#

(<B:]KO!" Emacs $ODL>o%(%G%#%?$,=PMhkH;Wol$F$$$k5!G=rOk+$K>e2s$k3HrdCFN1k
$`$7$m!vextensible computing environment (3HD%2DG=7W;;5!4D6-)!WHG$b$$$&Y-$@$m$&!#$^$"!"$AgC$
D9C?i7$$%U%l!<%:KJCF7^$&$7!"$"$J$?$, Emacs NCfG9kA4FN3H — %^%dNq$d7n$NK~$A7g$
Y?$j!"B?9`<0$r@0M}7?$j!"%3!<%I$r%G$P%C%0$7$?$j!"%U%!%$%k$r07C?$j!"<j;f$rFIs@$j=q$$$?j
3H — ObCH$b9-$$0UL#GOJT=8 (edit) $NHOaF$KB0$9$kbNGO$"$k$,!#)

2?OHb"$l!" Emacs Lisp $O%F%-%9%H%(%G%#%?$K4X9k8@8l$H;W$ol,AG$"$k$,!"<B:]$O7W;;5!A4BN
9k%W%m%0%i%_%s%08@8lG"$k!#$"J?O3$N8@8l$rB>$N%W%m%0%i%_%s%08@8l$HF1$8MM$K;H$&$3H,=PMh$k

B?J,!"$"$J$?$O%W%m%0%i%_%s%0$rM}2r$7$?$$$H;WCF$$$k3H$@$m$&!#$"$k$$$O!" Emacs $N5!G=$r3HD%$
H+!"%W%m%0%i%^KJj?$$$H;WCF$$$k$+$b7l$J$$!#

3N Emacs Lisp KD$$$F$NJ8=q$O!"$=$N=PH/E@$r<($9$3$H$r0U?^$7$F$$$k!#D^$j!"$"J?$r%W%m%0%i
%0$N4pK\E*$J;vJA$K47$l5;!"99Kh$jBg@Z$J3H$@$,!"$"$J$?$,<+J,<+?HGh$j@h$K?J$`$KOI$&$7$?$
$r<($9$3$H$rL\E*$H7F$$$k!#

3NJ8=qNCfK$O!" Emacs NCfGAvi;k3HN=PMh$k>.$5$J%5%s%W%k%W%m%0%i%`$,EP>l9k!#3NJ
GNU Emacs $N Info NCfGFIaP!"$=$N%W%m%0%i%`r=$N>l$GAvi;k3H,=PMh$k!# ($3lO4JC1$K<B9T=
$k!#$=$NJ}K!$O$=$N%W%m%0%i%`$,=P$F$-$?;~$K@bL@$9$k!#) $"$k$$$O!"3NJ8=q$r0u:~@=K\$7 Emacs $,Av$
$k7W;;5!$N$=$P$K:B$jJ,iFI`3H$@$C$F=PMh$k!# (;dO3$NJ}K!$,9%$-$@!#;d$O0u:~$5l?K\$NJ}$,9%
$G!#) Nc$($"$J$?$N6a$/$G Emacs $,F0$$$F$$$J$/$F$b!"$3$NK\$rFI$`$3HO=PMh$k!#$,!"$=$N>l9gO3l
$+!"$^$@9T$C$?$3HN$J$$9q$NN99T%,%$%INh$&$K07$&$N$,NI$$$@m&!#LLGr$$$K7F$b<B:]$H$O0c$&bN

3NJ8=q$NB?$/$NItJ,$O!" GNU Emacs NCfG;Hol$k%3!<%I$N%,%$%I%D%"!<$H$$$&Y-3HKHqd$5
$$$k!#3liN%D%"!<$NL\E*$O<!NFsDG"$k!#0l$DL\$O!"$"$J$?$r<B:]$KLrN)$D%3!<%I ($"$J$?$,KhF|;
%I) $K?F$7$^$;k3$H!#Fs$DL\$O!"$"$J$?$r Emacs $r3hMQ$9$kJ}K!$K?F7^$;$k3HG"$k!#%(%G%#%?$,$
$&$K<BAu5l$F$$$k$+$r8+k3HOLLGr$$$bNG$"$k!#$^$?!";dO"J?$,%=!<%9%3!<%I$rD/ak=,47$r?
k3HrK>sG$$$k!#$"$J$?$O$=$3$+$i$$$m$$$mJ3Hr3X$S!"$=7F$"%$%G%#%"$rH/7!$9k3H,=PMh$k!
Emacs $r<j$KF~lk$H$$$&3H$O!"Ju$,1#5l$?%I%i%4%s$NF67"$rH/8+$7$?$h$&$JbNJNG"$k!#

3liNNc$d%,%$%I%D%"!<rDL7$F!"%(%G%#%?$H7F$N Emacs $r3X$s$@$j!"%W%m%0%i%_%s%08@8lH
Emacs Lisp $r3X=,$9k@1GJ/!" Emacs $, Lisp %W%m%0%i%_%s%04D6-G"k3HrM}2r9k$-$C$+$1$,
$($ilk3H$@$m$&!# GNU Emacs $O%W%m%0%i%_%s%0$r%5%]!<%H$7!"$"J?$,2wE,$K;H$$$3J7$?$/Jk$
MM!9$JF;6q$rM?$($F$/$l$k!#Nc$($P M-. (find-tag %3%^%s%I$rH/@8$5$;$k%-!<) Js$+$,$=$&$@!#$^$?!"%(
%?4D6-$N0lIt$G$"$k%P%C%U%!d=$NB>$NbN$r3X$Y$k!# Emacs N3li$NFCD'$r3XV3HO!"$"J?$,8N
$k?7$7$$%k!<%H$rC5$9$3$HKNc(ilh&!#

:G8e$K;d$O!"$"$J$?$,$^$@CNiJ$$%W%m%0%i%_%s%0$NB&LL$r3XV?aK Emacs $rMxMQ$7$F=PMh$k4vD+$
%K%C%/rEA(k3H,=PMhlP$H;W$&!#Fq2r$J;vJA$rM}2r7?$j!"2?$+?7$7$$$3Hr7?j9$k:]!"$=$N2
K7P7$P Emacs $=$NbN$rMxMQ$9k3H,=PMh$k!#$3$&$$$C$?<+8J407k@-$,$"$k3H$O!"C1$K5$J,$,NI$
$&$$@1GJ/!"<B:]$KHs>o$KJXMxJbNG$"$k!#

3l$OC/$N$?$a$K=q$+l?bN$+

3NJ8=q$O!"%W%m%0%i%^$GOJ$$?M!9XN!"=iJbE*$JF~Lg=q$H7F=q$+$l$F$$$k!#b7!"$"$J$?$,%W%m%0
$"$kJi!"$"$J$?$O3Nh&$J4JC1$JbNGOK~B-=PMh$^$$!#$H$$$&Nb!"$"$J$?$O4{$K%j%U%!%l%s%9%^%
rFI`NK=OC#7F$$$k$+$b7l$J$$$7!"$=$N>l9g3NJ8=qNh$&$J=q$-J}$GO^ImC3$7$/46$8$k$@$
$@!#

Nc$($P!"3NJ8=qrFIs$@$"$k=ON}$7$?%W%m%0%i%^$O!";d$K<!$Nh&$K8@$C$?!#

KM$O!"%j%U%!%l%s%9%^%K%e%"%k$+$i3X$VJ}$,9%$-$Js@!#3F!9$N%Q%i%0%i%U$K!V%@%$%V$7$F!W$=7F
3F%Q%i%0%i%U$N4V$G!VB)7Q$.$r9k!W46$8$@!#

KMO"$k%Q%i%0%i%U$N:G8e$KC)$jCe$$$?$i!"$=$N<gBj$K$D$$$F$O=*N;$7$?$bNH8+Jo9s$@$h!#D^
$j!" (<!$N%Q%i%0%i%UGh$j>\$7$$$3H,@bL@5lkh$&$J>l9g$r=|$$$F) I,MWJ3HOA4$FJ,$C$?
$H9M$(ko1Js@!#$@$+$iL5BL$JBt;3$N7+$jJV7,J/CF!"I,MW$J>pJs$,:\$C$F$$$k8D=jXN%]
%$%s%?$,$-$AsH@0Hw5l$F$$$kh&JN$,$$$$$J!#

3NF~Lg=qO3Nh$&$J?MN?aK=q$+$l$?$NGO$J$$!*

$^$:0l$DL\$K!";d$OA4$FN3Hr>/J/Hb#32s$O7+$jJV9h$&$K7?!#$^$:O=lr>R2p$7!"<!$K$=$l
$J>l9g$K;Holk+$r8+$F!"$=$7$F!"JL$N;HolJ}$r8+$k$+!"$=lrI|=,9k$H$$$C$?6q9g$@!#

Fs$DL\$K!";dO=$N<gBj$K$D$$$F$NA4$F$N>pJs$r0l2U=jK^Hakh$&$J3HOKXI7J$+$C$?!#$^7F
DN%Q%i%0%i%U$K2!$79~akh&J3HOHr1?!#3l$O8D?ME*$J9M$($@$,!"$=$&$$$&djJ}$OFI<T$K2a>
$r6/$$$k3HKJ$k!#$=NBeojK!";d$O3F!9$N>l9gKI,MWJ3H$@$1$r@bL@$9kh$&$K?4$,$1$?!# (;~!
$G@5<0$K@bL@9k;~$K8MOG$&3HNJ$$$h$&!"$AgC$H@hAv$C$?;vJA$N@bL@$b4^$a$?$j7?$,!#)

3NJ8=qrFI`;~$O!"$"J?$OA4$FN3Hr=iaF3XVbNH9M$($ilF$$$k!#<h$j>e$2il$?4v$D$+$N
$D$$$F$O!"8@$o$P!"2q$($P2q<a$9$kDxEY$N@u$$IU$-9g$$$7$+$9kI,MW,$J$$$bNb$"$k!#$"$J$?$,K\Ev$KB
H,2?$+$K5IU-!"$=$l$K=8Cf$9k3H,=PMhk@1N==J,$J%R%s%H$rDs6!=PMhkh$&$K!"3NJ8=qr&$
=PMh$F$$$lPH;W$&!#

$"$J$?$O!"4vD+$N%Q%i%0%i%U$K$O!V%@%$%V9k!WI,MW$,$"$k!#$=liKO!"JLNbCH3ZJFI_J}$,$
GO$J$$!#7+$7!";d$O$=$Nh&$J%Q%i%0%i%U$N?tOJkY$/2!$5$($?Dbj@!#3NK\$O!"$=$S$($?$D;
$/!"$AcsHEPk3H$,$G$-$k5VG"kh$&$K=q$+$l$F$$$k!#

3N !xEmacs Lisp Kh$k%W%m%0%i%_%s%0!Y — =i?4<TN?aNF~Lg — $O<!$NK\$H7;Do4X78K"$k!#

!x*The GNU Emacs Lisp Reference Manual*!Y![1]

%j%U%!%l%s%9%^%K%e%"%kKO!"3NF~Lg=qhj$b>\$7$$$3H,:\$C$F$$$k!#$^$?%j%U%!%l%s%9%^%K%e%"%k
$"$k%H%T%C%/KD$$$F$NA4$F$N>pJs$O0l2U=j$K8G$^CF$$$k!#b7$"$J$?$,!">e$K5s$2$?%W%m%0%i%^$Nh
%WJi!"3CArFI$`$Y$-$@m&!#$^$?!"L^O@3NF~Lg=qrFI_=*$($?8e!"<+J,<+?H$G%W%m%0%i%_%s%0$r$
KO!"%j%U%!%l%s%9%^%K%e%"%k$,$$$m$$$m$HJXMx$G$"$k3H$,G<F@=PMh$k$@$m$&!#

Lisp $NNr;K

Lisp $O:G=i!" 1950 G/Be$N=*oj$K!"%^%5%A%e!<%;%C%D9)2JBg3X$G?M9)CNG=$N8&5fN?aK3+H/5l$?!#
8@8l$,;}$DAG@2$7$$G=NO$O!"Nc$($P!"%(%G%#%?$N%3%^%s%I$r=q$/JI$N!"B>$NL\E*KD$$$F$bM%=($5$rH/4x

GNU Emacs Lisp $O Maclisp $N1F6A$rB?$/<u$1$F$$$k!# Maclisp $O 1960 G/Be$K MIT $G=q$+l?!# Common Lisp $N1F6A$b$$$/J,<u1F$$$k!#3AiO 1980 G/Be$KI8=`$HJC$?!#$7$+$7J,$i!" Emacs Lisp $
Common Lisp HHfY$FHs>o$KC1=cG"$k!# (I8=`E*$J Emacs $NG[I[$K$O!"%*%W%7%g%s$H7F ‘cl.el’ $,4^$
lF$$$k!#3l$O Emacs Lisp $KB?$/$N Common Lisp $N5!G=$rIU$12C$(k?aNbNG"$k!#

=i?4<T$N?M$X

b7$"$J$?$, GNU Emacs KD$$$FCNiJ$$$H7F$b!"$3$NJ8=q$K$O2?$+7iLr$KN)$D3H$,=q$+lF$$
m&!#7+7J$,$i!"$?$H$(!"%3%s%T%e!<%?$N%9%/%j!<%sNCfrF0$-2s$k$H$$$&3H$@$1GbNI$$$+$i!"
$r3X$V3H$rA&$a$k!#$"J?$O%*%s%i%$%s$N%A%e!<%H%j%"%k$r;HCF<+J,<+?HG=$N;H$$J}$r3X$Y$k!#$=$

[1] F|K\8lLub"$k!#!xGNU Emacs Lisp %j%U%!%l%s%9%^%K%e%"%k!Y Bil Lewis, Dan LaLiberte and the GNU Manual Group Cx!"1]JB;LCR 0fED>;G74FLu!"H/Gd 4]A1!"H/9T F)EZ<R!"Dj2A 6796 1_!" ISBN 4-924828-39-4

$O!" **C-h t** $H%?%$%W9k$@$1Gh$$!# (3l$O **CTRL**%-!<$H **h** %-!<$rF1;~$K2!7FN%$7!"<!$K!" **t** %-!<$r2!$
N%$9$3Hr0UL#9k!#) (LuCp!' Mule Ji$P!" **C-h T** $GF|K\8l$d4Z9q8l!"Cf9q8lEy$N%A%e!<%H%j%"%k$,9T$($

$^$?!";dO7P7$P Emacs $NI8=`E*$J%3%^%s%I$r!"$=$N%3%^%s%I$r0z$-5/$3$9%-!<$r=q$-!"$=$N8e$K!
%3%^%s%I$NL>A0$r3g8LG/$/$C$F=q$/3H$G<($7$?$j9k!#Nc$($P **M-C-** (**indent-rigion**) $H$$$C$?46
$@!# ($b$7K>$`Ji!"$=$N%3%^%s%I$r0z$-5/$3$9$?$a$K%?%$%W9k%-!<$r8r49$9k3Hb=PMh$k!#$3lO!"
%s%G%#%s%0 (*rebinding*) $H8F$Plk!# Section 16.11, "%-!<%^%C%W", p. 149, ;2>H)!#3N **M-C-** $H$$$>J
N,7A$O!" **META** %-!<$H **CTRL** %-!<$H **** %-!<$rF1;~$K%?%$%W9k3H$r<($7$F$$$k!#3Nh&JAH_9go;$C
%-!<%3!<%I$H8F$Plk!#M}M3$O!"%T%"%N$G%3!<%IrCF/NK;w$F$$$k$+$iG"$k!#$b$7!"%-!<%\!<%I$K **MET**
$,L5$1lP!" **ESC** %-!<$,$=NBeojKJk!#3N>l9g$O!" **M-C-** $O!"$^$: **ESC** $r2!$7$FN%$7!"$D$$$G!" **C**
$H **** $rF1;~$K%?%$%W$9k3Hr0UL#9k!#

b7!"3NJ8=q$r GNU Emacs $N Info $r;H$CFFIs$G$$$kJi!"3NJ8=qA4Fr$?$@C1$K%9%Z!<%9%P!
SPC $r2!$7B3$1$k3HGFIsG7$^$&3H$,=PMh$k!# (Info KD$$$F3XVK$O!" **C-h i** $H%?%$%W$7!"$D$$$G
$rA*Br$9lPNI$$!#)

8@MU$N;H$$J}KD$$$F$NCm0U$@$,!";d$,C1FH$G Lisp $H$$$&C18l$r;H$&>l9g$O!"Bg35!" Lisp $NMM!9$JJ}8
DLMQ9k!"0lHLE*$J;vJA$r=RYF$$$k!#7+$7!" Emacs Lisp $H8@$&H-OFCK GNU Emacs Lisp N3H
8@5Z7F$$$k!#

<U<-

<9I.$K:]$7=u1FD:$$$?A4FN?M!9$K46<U$7$^$9!#FC$K!" Jim Blandy, Noah Friedman, Jim Kingdon,
Roland McGrath, Frank Ritter, Randy Simith, Richard M.Stallman, $=$7$F!"Melissa Weisshaus $K
46<U7^$9!#$^$?!"Philip Johnson $H David Stampe $NG&BQ6/$$Ne$^$7Kb46<U7^$9!#$3$NJ8=q$N4V0c$
$O!"A4$F;d$N@UG$$G$9!#

Lu<T$^$($,$-

3NJ8=q$O Robert J. Chassell ;a$N!xProgramming in Emacs Lisp: A simple introduction!YrLu7
$?$bNG$9!#8D?MMQ$NLuJN$G@[$$=j$bB?$/!"$^$?7A<0>eb"$^$j7C$+$j7F$O$$$^$;$s!#$,!"0l1~<BM
$($ilkNGOJ$$$+$HH=CG$7$F$$$^$9!#$^$?!"Lu<T$N<BNOITB-N?aKLu$K4V0c$$Ey$,4^$^lF$$$k$H;
9,!"$*5$IU$-$NJ}$OO"Mm$7$F$$$?$@$1kH4r7/;W$$$^$9!#

1 List =hM}

71N}$r<u$1FJ$$?MKHCF$O!" Lisp $O4qL/$J%W%m%0%i%_%s%08@8lG"$k!# Lisp $N%3!<%I$NCfKOE~$
3g8L$,8+<u$1il$k!#Cf$K$O!" Lisp $H8@$&L>A0$O!" ‘Lots of Isolated Silly Parentheses’ $rI=$o7F$$$k$N
$@$H$[$6$/?M$^$G$$$k!#7+$7!"$3lO:,5rNJ$$<gD%G"$k!# Lisp $O LISt Processing $rI=$o$7!"%j%9
($d!"%j%9%H$N%j%9%H) $rN>B&$r3g8L$G69$s$G07$&%W%m%0%i%_%s%08@8lG"$k!#3g8L$O!"%j%9%H$N6-3&$r<(
$k!#;~!9!"%j%9%H$NF,$K%"%]%9%H%m%U%#!"B($A0zMQId ‘’ $,IU$$$F$$$?j9k3Hb$"$k!#%j%9%H$O Lisp $
G"$k!#

1.1 Lisp $N%j%9%H

Lisp NCfG$O!"%j%9%H$O **’(rose violet daisy buttercup)** $H$$$&3J9%r7$F$$$k!#3N%j%9%H$NF,$K
$O0l$D$N%"%]%9%H%m%U%#$,IU$$$F$$$k!#3l$O!"$hj"J?$,?F$7sG$$$kG"m&<!Nh$&$J7A$N%j%9%
3H$b=PMh$k!#

```
’(rose
  violet
  daisy
  buttercup)
```

3N%j%9%H$NMWAG$O;MDN0[Jk2V$NL>A0$G$"$j!"3F!9$,6uGr$G6h@Zil!"3g8L$K0O$^lF$$$k!#3l$O@
0O$^$l$?9->l$N2V$rO"A[$5$;$k!#

%j%9%HO^$?!"MWAG$H7F?tCM$r;}$D3H$b=PMh$k!#Nc$($P!" **(+ 2 2)** Js$+$,$=$&$@!#$3$N%j%9%H$O%W%
Id9f ‘**+**’ H=$N8e$KB3$/Fs$D$N ‘2’ $r;}$C$F$$$F!"3F!9$O6uGr$G6h@Zil$F$$$k!#

Lisp NCfG$O!"%G!<%?$H%W%m%0%i%`$NN>J}$,F1$8MM$KI=8=5l$k!#$D$^$j!"3liO6&$K!"6uGr$G6h@Z$
8L$G0O$^l?C18l$d?tCM$dB>$N%j%9%H$+iJ$k%j%9%H$G$"$k!# (%W%m%0%i%`$,%G!<%?$H;w$F$$$k$?$a$K!"$
%0%i%`$OMF0W$KB>$N%W%m%0%i%`$N%G!<%?$H7FLr$KN)$D; 3l$, Lisp $N6K$a$F6/NO$JFCD’$N0l$DG"$k.)
GK8@CF$*$/$H!"$3$ND>A0$N3g8L$G0O$^l?JdB-$O Lisp $N%j%9%H$GOJ$$!#$H$$$&Nb!"3liO ‘;’ $
$H$$$&6gFIE@rCfK4^sG$$$k$+$i$@!#)

(LuCp!’F|K\8lH7FOJQ$+$b7l$J$$$,!"D8D^$r9g$o$;$k$?$a$K ‘;’$H ‘.’ $r;H$C$?!#)

$3$3GJLN%j%9%HNNcr5s2h$&!#:#EY$OCf$K%j%9%H$r4^sG$$$k!#

```
’(this list has (a list inside of it))
```

3N%j%9%H$N9=@.MWAG$O!" ‘**this**’, ‘**list**’, ‘**has**’, $H$$$&C18l$H!" ‘**(a list inside of it)**’ $H$$$&%j%9%H
G"$k!#FbIt$K$"$kJ}$N%j%9%H$O!" ‘**a**’, ‘**list**’, ‘**inside**’, ‘**of**’, ‘**it**’ $H$$$&C18l$+$iJC$F$$$k!#

1.1.1 Lisp $N%"%H%`

Lisp NCfG$O!":#$^$GC18l$HFIsGMh$?$bNO!" *atom* (%"%H%`) $H8F$Plk!#3N8@MU$ONr;KE*$K$O!V
0J>eJ,2r=PMh$J$$!W$H$$$&0UL#$rI=$o$9C18l%"%H%`$+iMhF$$$k!# Lisp KD$$$FOC7F$$$k8BjO!"2f!9
%HNCfG;HCF$-$?C18l$O!"$=$l0J>e>.$5$J%W%m%0%i%`$N%Q!<%HKOJ,2r=PMh$J$$!#$=$l$O?t;z$d ‘**+**’ $_
0lDNJ8;z$+$iJk5-9fGbF1$8$G$"$k!#0lJ}%j%9%H$O!"%"%H%`$H0cCF4vD+$NItJ,$KJ,2r9k3H$,=
(Chapter 7, “**car cdr & cons**: 4pK\4X?t”, p. 57, ;2>H!#)

%j%9%HNCfG$O3F!9$N%"%H%`$O8_$$$K6uGr$G6h@Z$ilF$$$k!#$^$?3g8LN9$0NY$j$K0LCV$9k3H,=PMh

5;=QE*$J8@$$J}r9kH!" Lisp $N%j%9%H$H$O!"6uGr$G6h@Zil$?!"$$$/D+$N%"%H%`$J$$$7$OB>$N%j%9
$k$$$O%"%H%`$HB>$N%j%9%H$NN>J}$r3g8L$G$/$/$C$?$b$N$G$"$k!#Cf$K$O0l$D$7$+%"%H%`$,L5$/FbNI$$$7!
$/$F$bNI$$!#Cf$K2?$bF~CF$$$J$$%j%9%H$H$$$&NO () G"k,!"3l$O6u%j%9%H (*null list*) $H8F$Plk
%j%9%H$OF1;~$K%"%H%`Gb%j%9%HGb$"$kM#0lNbNG$"$k!#

%"%H%`$d%j%9%H$rI=<(7?bN$O!" *symbolic-expression*, b7$/$ObC$H4JC1$K#S<0$H8F$Plk!# *Expres-
sion* $H$$$&C18l<+?H$O!"I=<($5l?I=8=$+!"$"$k$$$O7W;;5!$NFbIt$KJ];}5l$F$$$k%"%H%`$d%j%9%H$N$I

$rI=$o$9!# *Expression* $H$$$&8@MUO7P7$P[#Kf$KMQ$$$ilk!#($^$?!"B?$/$NK\$G$O7A<0 (*form*) $H$$$&8
$, expression $NF10U8l$H7F;Hol$F$$$k!#)

(LuCp!'3NLuGO0J2<!" expression $r<0!"$J$$$7$O#S<0$HLu7F$$$k3H$,B?$$!#)

$D$$$G$@$,!"2f!9$N@$3&$r9=@.$7$F$$$k%"%H%`(86;R)$,$=$&L>IU$1il$?$N$O!"$=li$,J,3dIT2DG=$H
lF$$$?;~N3HG$"$k!#7+7=$N8e!"J*M}$G8@$&%"%H%`$OJ,3dIT2DG=GO$J$$$3H,H/8+5l$?!#J*
0lDN%"%H%`$+$[$\F1$8%5%$%:$NFs$D$NItJ,$KJ,Nv$9$k!#(LuCp!'0UL#ITL@!#) J*M}$G8@$&%"%H%`O^$@$=
$N@-<A$,2rL@5lL^$^$K;~4|>0AaK7$FL>IU$1ilF7$^$C$?!# Lisp NCfG$O!"$"$k<o$N%"%H%`!"Nc$(
(array) $O!"J#?t$NItJ,$KJ,2r=PMh$k!#7+$7!"$=$N%a%+%K%:%`$O%j%9%H$rJ,2r$9$k;~$N%a%+%K%:%`$H$O0c$
%9%H$NA`:n$K4X$9$k8B$j!"%j%9%H$NCf$N%"%H%`$OJ,2rIT2DG=G"$k!#

1Q8lK*1kNHF1MM!" Lisp $N%"%H%`$r9=@.9kJ8;zMWAG$O!"0l$D$NC18l$H7F$NJ8;z$H$O0c$&!#Nc$(
%"%a%j%+%J%^%1%b%N (South American sloth) $rI=$o$9 'ai' $O 'a' $H 'i' $H$$$&FsDNC18lHOA4$/0[$J$k!#

<+A3NCfK$OBt;3$N<oN`$N%"%H%`$,$"k,!" Lisp NCfK$O?t<oN`$N%"%H%`$7$+$J$$!#Nc$($P!" 37!" 5
1729 $H$$$C$??tCM (*number*)!"$=7F '+'!" 'foo'!"$d 'forward-line' $H$$$C$?%7%s%\%k (*symbol*) Js
$+$G$"$k!#:#$^$G5s2?%j%9%HNNcNCf$K=P$F$-$?C18l$OA4$F%7%s%\%kG"$k!#IaCJ$N Lisp $N2qOC$G$O!"
$H$$$&C18lO"$^$j;Hol$J$$$,!"$=$l$O%W%m%0%i%^$OIaDL:#;HCF$$$k%"%H%`$,$I$N<oN`$N%"%H%`$+r
E*K_h&H7$F$$$k$+$iG"$k!# Lisp $N%W%m%0%i%_%s%0$ObCQi%j%9%HNCfN%7%s%\%k ($H!"$H$-$I$
KD$$$FNbNG$"$k!#($D$$$G$K8@$&$H!":#=P$F$-$?;0DNC18l$r3g8L$G$/$/C?bNOAcs7?%j%9
$k!#2?8N$J$i!"$=lO%"%H%`$+$iJj(:#$N>l9g$O%7%s%\%kG"$k)!"6uGr$G6h@Zil!"3g8LG/$/$ilF
Lisp GJ$$$h$&$J6gFIE@$O4^$sGJ$$$+iG$"$k!#)

$=$l$K2C$($F!"Fs$D$NFs=E0zMQId$G69$^$l$?%F%-%9%H$O — $=$l$,0l$D$NJ8$G$"$m$&$H!"$"$k$$$O%Q%i%0
$"$m$&$H$b — %"%H%`$G$"$k!#Nc$r5s$2F*3&!#

```
'(this list includes "text between quotation marks.")
```

Lisp GO6gFIE@$,F~$C$F$$$h$&$,6uGr$,$"m&$,!"A4$F$NFs=E0zMQId$G0O$^$l$?J8$O0lDN%"%H%`G"$k
<o$N%"%H%`$O J8;zNs (*string*) $H8F$P$l!"7W;;5!$,?M4V$,FI$a$k7A$G%a%C%;!<%8$r=P$9MQESEy$K;H$olk!#J
$O?tCM$H$b%7%s%\%k$H$b0c$&<oN`$N%"%H%`G"$j!"0[$J$k;H$$J}r5lk!#

1.1.2 %j%9%HNCfN6uGr

```
'(this list
   looks like this)
```

$O!"<!$N%j%9%H$HA4$/F1$8$G$"$k!#

```
'(this list looks like this)
```

IAiNNc$b!" Lisp KHCF$O 'this'!" 'list'!" 'looks'!" 'like'!"$=$7$F 'this' $H$$$&%7%s%\%k$,$3$N
=gHVGJBs$G$$$kA4$/F1$8%j%9%HG"$k!#

M>J,$J6uGr$H2~9T$O!"?M4V$,hj%j%9%H$r8+$d$9$$$h$&$K9k$?$a$KMQ$$$ilF$$$k!# Lisp $,I=8=$rFI$
;~$O!"A4$F$NM>J,$J6uGr$r=|$$$F7^$&($?$@$7!":GDc0l8D$N6uGr$O;D7F$$$k!#$=$&GG$J$$$H%"%H%`H%
6h@Zj,J,iJ$/$JCF7^$&)!#

4qL/$K;W$(k+b7lJ$$$,!":#$^$G8+F-$?Nc$G!"KXsI$N Lisp $N%j%9%H$O%+%P!<5lF7$^$&!# Li
$*$1$kB>$NA4FN%j%9%H$O!"B?$+$l>/$J$+$l!"3liNNcNIl+$K;w$F$$$k!#$^$"!"bC$HD9$/JC$?$
KJC?$?$jO9k,!#4JC1K^HakH!"%j%9%H$O3g8L$K64$^$l!"J8;zNs$OFs=E0zMQId$K64$^$l!"%7%s%\%
8lNh$&$JbN$G!"?tCM$H$O?t$Nh&JbNG$"$k!#($"$k>l9gKO!"3Q3g8L$d!"%I%C%H!"$=lKB>$NFCJ
$,;H$ol?jb9k!#7+$7!"$=li$,L5$/Fb2f!9O+Jj@h$^$G?Jak!#)

1.1.3 GNU Emacs Kh$k%j%9%H$N%?%$%W$N;Y1g

b7!"$"$J$?$, Lisp $N#S<0$r GNU Emacs $N Lisp Interaction mode b7$/$O Emacs Lisp mode NCfG
%?%$%W$7$F$$$kJi!"4vD+$N3%^%s%I$r;HCF!" Lisp $N#S<0$r@07A$7FI$_d$9$$$bNK9k3H$,=PMh

$($P TAB %-!<$r2!$9$H!"%+!<%=%k$,$"$k9T$r<+F0E*$KE,Ev$JJ,$@$1%$%s%G%s%H7F$/$l$k!#%j!<%8%g%sFb
%Ir-As$H%$%s%G%s%H7F$/$l$k%3%^%s%I$O!" M-C-\ $K%P%$%s%I5l$F$$$k!#%$%s%G%s%H$O!"$"$J$?$,
MWAG$,$I$N%j%9%H$KB0$7$F$$$k$+8+$d$9$$$h$&$K — %5%V%j%9%H$NMWAG$,$=$l$r4^$s$G$$$kh&$J%j%9%H$N
jb?<$/%$%s%G%s%H5lkh$&$K — @_7W5l$F$$$k!#

99$K!"$"J?$,3g8L$rJD8k;~$K!" Emacs $O01;~E*$K$=$N3g8L$K%^%C%A$9$k3+$-3g8L$N0LCV$K%8%c%s%W$
$=$&9k3HGI$N3g8L$KBP1~9k$+$r3N$+$ak3H,=PMh$k!#$3lOBgJQJXMxG"$k!#$H$$$&Nb!"$'
Lisp $G%?%$%W9kA4FN%j%9%HKD$$$F!"3+$-3g8L$K$OI,$:JD$83g8L$,$-$AsHBP1~7F$$$J1lPJ$i
iG$"$k!# (Section "Major Modes" in *The GNU Emacs Manual*, $K Emacs $N mode Nh$j>\$7$$@b
L@$,=q$+lF$$$k!#)

1.2 %W%m%0%i%`$N<B9T

Lisp K*1k%j%9%H$O!"Nc$(Is$J%j%9%H$G$"$CFb$=$N$^$^Avi;k3H,=PMh$k!#<B:]$KAvi;F
(Lisp $N@lLgMQ8l$G$O I>2A (*evaluate*) 9k$H$$$&)!"7W;;5!$O<!$N#3DN$&$A$$$:l+$NF0:n$r9k!#$^$:
$=$N%j%9%Hr=N^^JV9$@$1$G2?$b7J$$!"b7$/$O!"$"$J$?$K%(%i!<%a%C%;!<%8rJV9!"$"$k$$$O!"%
@hF,$N%7%s%\%k$r%3%^%s%IH7$F07$$!"JK$,$7$+$N3Hr9$k!# (IaDL$OL^O@!":G8e$NF0:n$,$"$J$?$N5a
NG$"$m$&!#)

0JA0$N%;%/%7%g%s$G5s2?NcNCfG!"%j%9%H$NF,$KIU1?C1FH$N%"%]%9%H%m%U%#' $O!"0zMQId$J$$$7$O %/
%H (*quote*) $H8F$Plk!#3l$,%j%9%H$NF,$KIU$$$F$$$k>l9g$O!"2?$bIU$$$F$$$J$$>l9g$H0[$J$j!" Lisp $C
%j%9%HKD$$$F$O2?$b7J$/$F$$$$$s$@$J$H2r<a$9$k!#$7$+$7!"%j%9%H$NF,$K0zMQId$,IU$$$F$$$J$$>l9g$
%H$N:G=i$N9`$,FCJL$J0UL#$r;}$D!#D^$j!"$3lO7W;;5!$,=>$&Y-L?NaKJkN$@!# (Lisp GO3liN
4X?t (*function*) $H8F$Plk!#) 0JA05s2? (+ 2 2) $H$$$&%j%9%HKOF,$K0zMQId$OIU$$$F$$$J$$$N$G!" Lisp
+ $,;D$j$N%j%9%H$K4X9k2?i+$NL?Na$G$"$k$H2r<a$9$k!#$3$N>l9g$O!";DjN?t$r2C$(kH$$$&bNG"

b7!"3NJ8>O$r GNU Emacs $N Info NCfGFIsG$$$kNJ$i!"<!$Nh&K7F3Nh$&$J%j%9%H$rI>2
k3H,=PMh$k!#%+!<%=%k$r<!$N%j%9%H$N1&B&$N3g8L$N9$08e$K;}CF$-$F!" C-x C-e $H%?%$%W9kNG$'

```
(+ 2 2)
```

%(%3!<NN0h$K 4 $,8+$($?$O$:$@!# (@lLgMQ8lGO!"3N3H$r!V%j%9%H$rI>2A9k!W$H8@$&!#%(%3!<NN0h$H
$O%9%/%j!<%s$N:G2<9TN3HG$"$j!"%F%-%9%H$rI=<($J$$$7$O!V%(%3!<!W$9$k!#) 5F!"F1$8$3HrF,$K0z
IU$$$?%j%9%HGdCF$_$h$&!#%+!<%=%k$r2<$N%j%9%H$N9$08e$K0\F0$5$;!" C-x C-e $H%?%$%W9k!#

```
'(this is a quoted list)
```

3N>l9g$O%(%3!<NN0h$K (this is a quoted list) $H$$$&J8$,8+$($?$O$:$@!#

IAiN>l9gGb!"$"$J$?$N$O%3%^%s%I$r GNU Emacs $N *Lisp* %$%s%?%W%j%? (*Lisp interpreter*) $H8F$P$l
$k%W%m%0%i%`$KEO7F$$$k!#D^$j!"%$%s%?%W%j%?K=$N#S<0$rI>2A7m$H$$$&L?Na$rM?$($F$$$kN@!# I
%s%?!<%W%j%?$H$$$&L>A0$O!"#S<0$N0UL#$rDs6!$9$k — D^j=lr2r<a9k — $H$$$&?M4V$N;E;v$rI=o
$+$iMh$F$$$k!#

%j%9%H$N0lIt$GOJ$$!"C1FH$N%"%H%` — 3g8L$K0O$^$l$F$$$J$$$b$N — $rI>2A$9k3Hb=PMh$k!#$3$N>
Lisp %$%s%?%W%j%?$O?M4V$,FI$`3H$N=PMh$k#S<0$+$i!"7W;;5!$NFbIt$N8@8lXNK]Lur9$k!#$7$+$7!"$3
$$$F5DO@9kA0$K (Section 1.7, "JQ?t", p. 6, ;2>H)!"$^$:2f!9$,%(%i!<$rHH7?>l9g$K Lisp %$%s%?%W%j%?$,
r9k+$r8+$F$$$3$&!#

1.3 %(%i!<%a%C%;!<%8$N=PNO

$^$:!" Lisp %$%s%?%W%j%?$,%(%i!<%a%C%;!<%8$r=P$9h&$J%3%^%s%I$rM?$($F$_$h$&!#6vA3$3Nh$&$J$
7F7^CF$b2?$b?4G[9k3HOJ$$!#3l$O!"L532$JA`:nG"$k!#<B:]!"2f!9$O7P7P0U?^E*$K%(%
%;!<%8$r=P$5$;$k3H$,$"$k!#0lC6@lLgMQ8l$rM}2r7F7^$($P!"%(%i!<%a%C%;!<%8$+$iB?$/$N>pJs$rF@$
=PMh$k!#$=$&$$$&0UL#GO%(%i!<%a%C%;!<%8$H8@$&hj$O%X%k%W%a%C%;!<%8$H8@$&$Y$-$@m&!#8@oPB>$
Mh$?N99T<T$KHCFNF;I8Nh$&$JbNG"$k!#2rFI$9kN$OBgJQ$@1lIb!"0lEYM}2r7F7^$($P@5$
65$($F$/$lkH$$$&o1$@!#

2f!9$,9T$&NO!"F,$K0zMQId$,IU$$$F$$$J$$$Kb+$+$oi:!"@hF,$NMWAG$,0UL#$"$k%3%^%s%IGJ$$$h$&
%H$rI>2A$9k3HG$"$k!#$3$3$K!"2f!9$,5C$-;H$C$?%j%9%H$H$[$\F1$8$@$,!"F,$K0zMQId$,IU$$$F$$$J$
$"$k!#3l$ND>8e$K%+!<%=%k$r;}$C$F$$$C$F!" `C-x C-e` $H%?%$%W7F$_$h$&!#

```
(this is an unquoted list)
```

:#2s$O<!$Nh&$J%a%C%;!<%8$,%(%3!<NN0h$KI=<($5l?O:$@!#

```
Symbol's function definition is void: this
```

($=$l$H!"C<Kv$,%S!<%W2;rLDi7?$+$b7l$J$$ — LDi9bNb"k7!"LDi5$J$$$bNb$"$k!#%i%s%W
7?j9kNb"$k!#$3lOCm0U$r0z$/$?$a$NAuCV$G$"$k!#) %a%C%;!<%8$OB>$N%-!<$r%?%$%W9kH9$0$K
7^$&!#Nc$($=$l$,C1$K%+!<%=%k$r0\F0$7$?$@1G$"$CFb$@!#

2f!9$,4{$KCNCF$$$k3H$r4p$K7F!"3N%(%i!<%a%C%;!<%8r[$\2rFI$9k3H,=PMh$k!#2f!9$O ‘%7
$H$$$&C18l$N0UL#$rCNCF$$$k!#:#$N>l9g!"%j%9%H$N:G=i$N%"%H%`$G$"$kC18l ‘`this`’ N3Hr;X7F$$$k
?t’ $H$$$&C18l$OA0$K0lEY=PFMh?!#3l$O6K$a$F=EMW$JC18lG"$k!#$3$3$G$O 4X?t (*function*) HO7W;;5
$+$di;k?aNL?Na$N=8$^jG$"$k!"HG$bDj5A$7F*1P==J,$@$m$&!# (5;=QE*$K$O!"%7%s%\%k$O7W;;
=h$GL?Na$r8+D1lP$h$$$+$r65$($F$$$k3HKJ$k!#$7$+$7!"3NJU$N;v>p$OJ#;($@$7!"7Pi/$OL5;
oJ$$!#)

0J>e$G!" ‘`Symbol's function definition is void: this`’ $H$$$&%(%i!<%a%C%;!<%8$rM}2r$9k3H,
=PMhkh$&$KJk!#3l$O!"%7%s%\%k ($D$^$j!" ‘`this`’ $H$$$&C18l) KO7W;;5!$,<B9T=PMh$kh&$JL?Na%
$ODj5A$5lF$$$J$$$H$$$&3HG"$k!#

3N!" ‘`function definition is void`’ $H$$$&AgCH4qL/$J%a%C%;!<%8$O Emacs Lisp $N<BAu$N;EJ}$r
I=o9h&$K=q$+lF$$$k!#D^$j!"$=$N%7%s%\%k$KBP7F4X?t$,Dj5A$5lF$$$J$$>l9g!"L?Na$,4^$^l
$:$N>l=j$,6u (void) $@$H$$$&o1G"$k!#0lJ}$G!" `(+ 2 2)` $rI>2A$7$?;~$KAcsH 2 $K 2 $r2C$(k3H
MhkH$$$&3H$+$i!"%7%s%\%k `+` $O7W;;5!$,=>$&$Y$-L?Na%;%C%H$r;}CF$*$j!"$=$liNL?Na$O `+` $KB3$/
$($k$H$$$&J*G"kK0c$$$J$$$H?dB,=PMh$k!#

1.4 %7%s%\%k$NL>A0$H4X?tDj5A

2f!9$O:#$^$G5DO@$7F-$?$3HK4p$E$$$F!"JL$N Lisp $NFCD' — $=$l$b6K$a$FBg@Z$JFCD' — $r=R$Yk3
=PMh$k!#B($A `+` Nh$&$J%7%s%\%kO=$l<+?H$O7W;;5!$,<B9T=PMh$kh&$JL?Na$GOJ$$$H$$$&3HG"$k!#
oj%7%s%\%k$O!"B?J,!"0l;~E*$K!"L?Na$NDj5A$J$$$7$OL?Na$N=8$^$j$N0LCV$r8+D1$kJ}K!$H7F;H$&$3$
$k!#2f!9$K8+$($F$$$kNO!"$=$lrDL7$FL?Na$r8+D1k3HN=PMh$kL>A0$JNG$"$k!#?M4V$NL>A0$bF1$
9k!#;d$O ‘Bob’ H7$F8@5Z$5lk!#7+7J$,$i!";d$O ‘B’!" ‘o’!" ‘b’ $H$$$&J8;zGOJ/!"0l4S7FFCDj
L?BN$KIU?o$7$F$$$k$"$k0U<1G"$k!#L>A0$O;d$=$NbNGO$J$$$,!";d$r<($9NK;Hol$k!#

Lisp GO!"$"$"$kL?Na%;%C%H$K$O4v$D$+$NL>A0$,IU?o$7$F$$$k!#Nc$($P!"?t$r2C$(mH$$$&7W;;5!$NL?Na$
`+` $H$$$&%7%s%\%k$HF1MM!" `plus`$H$$$&%7%s%\%k$bIU?o$5$;$k3H$,=PMh$k!# (B>$N4v$D$+$N Lisp $NJ}8@$G
:]K=$&$JCF$$$k!#) ?M4V$N>l9g$G$b!";d$O ‘Bob’ $@$1GOJ/ ‘Robert’ H7$F8F$Plk3Hb"k7!"
8F$SJ}$r5lk3Hb$"$k!#

0lJ}$G!"0l$D$N%7%s%\%k$O!"0lEYK?$@0l$D$N4X?tDj5A$7$+;}$D3H$,=PMh$J$$!#$=$&GJ$$$H!"7W;;
$NDj5A$r;H$&$Y$-$+LBCF7^$&$+i@!#2>K3l,?M4V$N>l9g$G$"$l$P!" ‘Bob’ $H$$$&L>A0$O@$3&$G0l
4VK7$+$D1F$O$$$1$J$$$H$$$&3HG"$k!#$?$@$7!"L>A0$KIU?o$9$k4X?tDj5A$O4JC1$KJQ99$9k3H,=
(Section 3.2, “4X?tDj5A$N%$%s%9%H!<%k”, p. 20, ;2>H!#)

Emacs Lisp OG$+$$$N$G!"4X?t$,B0$9$k Emacs $N%Q!<%H$,<1JL=PMhkh$&$J%7%s%\%k$NL>A0$rIU$1J}$r
N,IaDLG"$k!#$H$$$&o1$G!" Texinfo $r07$&$?$a$N4X?t$NL>A0$OA4$F ‘`texinfo-`’ $G;O$^CF$$$k$7!"%
%krFI`$?$a$N (reading mail) 4X?t$NL>A0$O ‘`rmail-`’ $G;O$^CF$$$k!#

1.5 Lisp %$%s%?%W%j%?

3l$^$G$K8+$F$-$?3H$+$i!"%j%9%H$rI>2A$9kh$&L?Na$7$?;~$K Lisp %$%s%?%W%j%?$,2?r9k+$rM
k3H,=PMh$k!#$^$:%$%s%?%W%j%?$O!" list $NF,$K!"0zMQId$,IU$$$F$$$k$+8+$k!#b7IU$$$F$$$l$P!"C1$K

%9%H$r2f!9$KEO$9!#01J}!"IU$$$F$$$J$$>l9g$O%j%9%H$N@hF,$NMWAG$r8+$K9T$-!"$=$1$,4X?t$NDj5A$r;}$C$ I&$+$rD4Yk!#Dj5A5l$F$$$k>l9gO=$NDj5A$K$"$kL?Na$r<B9T$7!"$=$&GJ1l$P%(%i!<%a%C%;!<%8$ $k!#

3l$, Lisp $NF0:n$G$"$k!#C1=c$@!#$3lK2C$($F<c43J#;(J3Hb$"$k!#$=$1KD$$$FO9$08e$G@bL $,!"4pK\$O$3$1$@$1G"$k!#L^O@!" Lisp $N%W%m%0%i%`$r=q$/:]$K$O!"4X?t$NDj5A$r=q$$$?j=1KL>A0$r KOI&$9$1$P$$$$$+!"$"$k$$$O$=$&$$$&3Hr"J?<+?H$d7W;;5!$,:.Mp7J$$$h$&$K9T$&$KOI$&$9$ $+Ey!"B>$KbCNiJ1lP$$$1$J$$$3HO$"$k$,!#

5F!"5C$-=R$Y$?!VJ#;($J3H!W$N01$DL\$O!" Lisp %$%s%?%W%j%?$O!"%j%9%H$K2C$($F0zMQId$,IU$$$ $:!"3g8L$K0O$^$lFb$$$J$$C1FH$N%7%s%\%k$bI>2A9k3H$,=PMh$k$H$$$&3HG"$k!#$3$N>l9g!" Lisp %W%j%?$O$=$N%7%s%\%kNCMrJQ?t (*variable*) H7$FI>2A$7h&H9$k!#$3$N3$HKD$$$F$OJQ?t$N%;%/%7% @bL@9k3HK9$k!# (Section 1.7, “JQ?t”, p. 6, ;2>H!#)

J#;(J3HNFs$DL\$O!"4vD+$N4X?t$O$=$NFC<l@-N?aKIaDLNd$jJ}$GO&$^$/F/$+$J$$$3HKhk h&$J4X?t$O FC<l7A<0 (*special form*) $H8F$Plk!#3liO!"Nc$($P4X?t$rDj5A$7$?$j$H$$$C$?FCJL$JMQES $D!#<!$N4vD+$N%;%/%7%g%s$GbC$HBg@Z$JFC<l7A<0$r>R2p$9kDbj$@!#

;0$DL\$N!"$=$7$F:G8e$NJ#;(J3HO3&$@!#$b$78=:_ Lisp %$%s%?%W%j%?$,8+$F$$$k4X?t$,FC<l7A<0$ $/!"$7$+$b$=$1$,%j%9%H$N01ItG"kJ$i!" Lisp %$%s%?%W%j%?$O%j%9%H$,FbIt$K%j%9%H$r4^sG$$$J$$$+ $r8+$k!#b7FbIt$K%j%9%H$r4^sG$$$l$P!"$=1,$=$NFbItGI$&$$$&3Hr9k+$r8+$k!#$=$7$F!"$= $=$N30B&$N%j%9%H$r=hM}9k!#$^$?!"b7$=$NFbIt$N%j%9%H$,99$KB>$N%j%9%HrCfK4^sG$$$l$P!"$^$:! @h$K=hM}7F$+$i$H$$$&3HKJ$k!#B($A!" Lisp %$%s%?%W%j%?$O>o$K0lHVFbIt$N%j%9%H$+$i=hM}7F$$$/ $O!"FbIt$N%j%9%H$N7k2L$r$=$lrJq`30B&$N#S<0$G;H$&>l9g!"FbIt$N%j%9%H$N7k2L$,I&Jk$+$r8+F+$ %j%9%H$r=hM}$7J1lP$$$1$J$$$?aG$"$k!#

$=$l0J30$N>l9g$O!"%$%s%?%W%j%?$O:8$+$i1&$X#S<0$r0lD:$D=hM}$7$F$$$/!#

1.5.1 %P%$%H%3%s%Q%$%k

2r<a$N;EJ}$K$D$$$F!"b&0l$D6=L#?<$$$3H,$"$k!# Lisp %$%s%?%W%j%?$OFsDN<oN`$NJ*$r2r<a=PMhk 3HG"$k!#0l$D$O?M4V$,FIak%3!<%IG"$j!"2f!9$O@li3lK>GE@rEvF$F$$$k!#b&0lDOFCJL$J% %3!<%I$G$"$j!"3l$O%P%$%H%3%s%Q%$%k (*byte compile*) 5l$?%3!<%I$G!"?M4VKFIa$kBeJ*$GOJ$$!#%P%$ %s%Q%$%k$5l?%3!<%I$O2f!9$,FIak%3!<%Ihj$bB.$/Avi;k3H,=PMh$k!#

?M4V$,FI$a$k%3!<%I$r%P%$%H%3%s%Q%$%k5l$?%3!<%I$KJQ49$9$k3H$b=PMh$k!#3l$O **byte-compile-f** Ey$N!"%3%s%Q%$%k%3%^%s%I$rAvi;k3HKhC$F9T$&!#%P%$%H%3%s%Q%$%k5l$?%3!<%I$OIaDL!" ‘**.el**’ $/!" ‘**.elc**’ $H$$$&3HD%;R$G=*$o$k%U%!%$%k$KJ]B8$5lk!# ‘**emacs/lisp**’JI$H$$$C$?%G%#%l%/%H%j%#$rG $P!"$3$NN>J}$N<oN`$N%U%!%$%k$,8+$D$+$k!#2f!9$,FI$`NO ‘**.el**’ $H$$$&3HD%;R$NIU$$$?J}G"$k!#

<B:]LdBjH7$F!"$"J?$, Emacs $r%+%9%?%^%$%:7?$j3HD%$7$?$j9k>l9gKOBgDq$O%P%$%H%3%s%Q%$% I,MW$O$J$$!#$=$7$F;d$b$3$3GO3NOCBjKD$$$F$O=R$Y$J$$!# Section “Byte Compilation” in *The GNU Emacs Lisp Reference Manual*, $r8+$l$P%P%$%H%3%s%Q%$%k$K$D$$$F$NA4$F$N>pJs$,:\$C$F$$$k!#

1.6 I>2A

Lisp %$%s%?%W%j%?$,$"$k#S<0$r=hM}$7$F$$$k;~!"$=$NF0:n$O I>2A (*evaluation*) $H8F$Plk!#D^$j!"!V% %?%W%j%?$O#S<0$rI>2A$9$k!W$Nh&$K8@$&o1$@!#;d$O3l$NMQ8l$r0JA0Kb2?2s$+MQ$$$?!#3NC18lO3$ F|>o2qOCGN0UL#!" *Webster's New Collegiate Dictionary* (5Z$S!">.3X4[!X%W%m%0%l%C%7%V1QOBCf<-E5!Y) $K hl$P!V2ACMdNLr3N$+ak!"35;;9k!"8+@Qbk!W$H$$$&0UL#!"$+$iMh$F$$$k!#

Lisp %$%s%?%W%j%?$O#S<0$rI>2A$7$?8e!"BgDq$=$N4X?t$NDj5ANCfK$"$k7W;;5!KBP9$kL?Na$r<B9T7?; NO9kCM$r JV$7 (*return*)!"$=$&GJ$$>l9g$O!"$*$=$i$/$=$N4X?t$r=hM}9kNr;_aF%(%i!<%a%C%;!<% NO9k!# (%$%s%?%W%j%?$O!"5^KJLN4X?trEO5lk3Hb"$jF@$k$7!"$"$k$$$ONI$/8@$&!VL58B%k!<%W!W $F8=:_$N=hM}$r2?2s$G$b7+$jJV$=$&H9k+b7lJ$$!#$,!"$3li$NF0:n$r9k3HO=$lDxB?$/OJ$ 2f!9O3li$N>l9g$OL5;k9k3HK9$k!#) D^jKXI$N>l9g!"%$%s%?%W%j%?OCMrJV$9!#

%$%s%?%W%j%?$OCMrJV9$HF1;~$K!"%+!<%=%k$rF0$+7?$j!"%U%!%$%k$r%3%T!<$7$?$j$H$$$C$?B>$NF0:n$k
3Nh&$JF0:n$O!"I{:nMQ (*side effect*) $H8F$Plk!#Nc$($P7k2L$rI=<($9kH$+!"2f!9?M4V$,=EMW$H9M$($k
b7P7$P!" Lisp %$%s%?%W%j%?KHCF$O!VI{:nMQ!W$G7+$J$$!#3N@lLgMQ8lKO0[OB46$,$"k+b7
$,!"I{:nMQ<+BN$N;H$$J}$r3X$VNO$+$J$j4JC1$@$H$$$&3H$,$=$NFbJ,$k$@$m$&!#

0J>e$^$Hak$H!" Lisp %$%s%?%W%j%?$O#S<0$rI>2A7?;~$K!"$^$:KX$I$N>l9g$"kCMrJV$7!"BgDq$O$"$kI
$r<B9T$9$k!#$=7F!"$=$&GJ$$>l9g$O%(%i!<$r=PNO9k!"$H$$$&3HKJ$k!#

1.6.1 FbIt$N%j%9%H$NI>2A

b7$"$k%j%9%H$NFbIt$N%j%9%H$,I>2A$5l?>l9g!"$=$N30B&$N%j%9%H$,I>2A5l$k;~$K$O:G=i$KFbIt$N%j
I>2A7?;~KJVC$?CM$r>pJsH7$F;H$&3H$,=PMh$k!#3N3H$+$i!"2?8NFbIt$N%j%9%H$,@h$KI>2A$5l
L@=PMh$k!#B($A!"FbIt$N#S<0$,JV$9CM$r30It$N#S<0$,MQ$$$k$?$aG"$k!#

2f!9O3$N%W%m%;%9$r<!Nh$&$JNc$G<B:]$K3N$+$ak3H,=PMh$k!#<!$N<0$ND>8e$K%+!<%=%k$r;}$C$F
C-x C-e $H%?%$%W7F$_$h$&!#

```
(+ 2 (+ 3 3))
```

?t;z$N 8 $,%(%3!<NN0h$KI=<(5l$?$O$:$@!#

3NNc$G5/$3C?3HO3$&$@!#$^$: Lisp %$%s%?%W%j%?$OFbIt$N#S<0$G$"$k (+ 3 3) $rI>2A$9$k!#$=$l
7FCM 6 $,JV$5lk!#$=$lKhCF30It$N#S<0$,$"$?$+$b (+ 2 6) G"kh$&$KI>2A5l!"CM 8 rJV9$3$
$k!#$3li$rFbIt$K4^$`I>2A$9Y-#S<0O3$l0J>eB8:_$7$J$$$N$G!"%$%s%?%W%j%?O3NCMr%(%3!<NN0h$
$k!#

5F!"$3$3$^$G$/$l$P C-x C-e $G0z$-5/$3$5lk%3%^%s%I$NL>A0$rM}2r9k3H$O4JC1$@!#3N%3%^%s%
A0$O **eval-last-sexp** HJCF$$$k!#3NCf$N **sexp** $H$$$&J8;z$O 'symbolic expression' (#S<0) $NN,$G$"
$k!#$H$$$&3H$G!"$3lOD>A0$N#S<0$rI>2A9k (evaluate last symbolic expression) 3H$rI=$7$F$$$k!#

<B83E*$K<!$K5s2kNc$N#S<0$ND>8e$N9T$N@hF,$d!"#S<0$NFbIt$K%+!<%=%k$r;}CF$$$C$F#S<0$rI>2A7
Hb=PMh$k!#

3l$,$=NNcG$"$k!#

```
(+ 2 (+ 3 3))
```

b7%+!<%=%k$r#S<0$ND>8e$N6u9T$N@hF,$KCV$$$F C-x C-e $H%?%$%W7?Ji!"$=$N>l9gbdOj 8 $,%(%3!
$KI=<($5lk3H$@$m$&!#$G$O<!$K!"%+!<%=%k$r#S<0$NFbIt$K;}$C$F$$$3$&!#:G8e$N3g8LN9$01&B&$N3g8
%+!<%=%k$r;}$C$F$$$C$F ($D$^$j%+!<%=%k$O:G8e$N3g8L$N>e$K8+$($F$$$k) $=$3$GI>2A$7$?$JiP!"%(%3!<
$O 6 $HI=<($5lk!#3l$O%3%^%s%I$, (+ 3 3) $H$$$&<0$rI>2A$7$?$+iG$"$k!#

:#EY$O%+!<%=%k$r?t;z$ND>8e$K;}CF$$$3$&!# C-x C-e H9kH$=$N?t;z$=NbN,JV$5lk!# Lisp $N
$O!"?t;z$rI>2A7?>l9g!"$=$NCM<+?H$,JV$5lk!#3l$,?t;z$,%7%s%\%k$H0c$&H3mG$"$k!#b7 + $_$
%s%\%k$r@hF,$K;}$D%j%9%H$ND>8e$G#S<0$rI>2A7?Ji!"JV5l$?CM$O$=$NL>A0$KIU?o$9$k4X?t$NDj5A$NC
$r7W;;5!$,<B9T7?7k2L$,JV$CF/$k!#$,!"b7%7%s%\%k$=$NbN$,I>2A$5l?JiJLN3H,5/$-$k!#$
$$$F$O<!$N%;%/%7%g%s$G8+$k3HK7h&!#

1.7 JQ?t

Lisp NCfG$O!"%7%s%\%k$O!"4X?tDj5A$r;}$D3H$,=PMh$kNHF1MM$K!"$"kCMr;}D3H,=PMh$k!#$3$
DOA4$/JL$NJ*G"$k!#4X?tDj5A$O7W;;5!$,=>$&Y-L?Na$N=8$^jG$"$kNKBP$7!"CM$O?tCMH+L>A0N
2?$+JQ2=$7F@kbNG$"$k!# (3Nh&$J%7%s%\%k$,JQ?t$H8F$PlkNO3N$?$aG"$k!#) Is$J Lisp $
$b%7%s%\%k$NCMKJ$jF@$k!#Nc$($P%7%s%\%k$d?tCM!"%j%9%H!"J8;zNs$Js+$,CM$HJk3H$,=PMh$k!#CM$
%7%s%\%kO7P7$PJQ?t (*variable*) $H8F$Plk!#

%7%s%\%k$O!"4X?tDj5A$HCM$NN>J}$rF1;~$K;}$D3H$,=PMh$k!#3NFsDOJ,N%5l$F$$$kN@!#3l$O!"
%j%C%8$H$$$&L>A0$,%^%5%A%e!<%;%C%D$NCfN"$kET;T$=NbNrI=o9NHF1MM$K!"$=$NET;TL>$KIU?o9
$+$N>pJs!"Nc$($P!"!VBg$-$J%W%m%0%i%_%s%0%;%s%?!<!WG"kH$$$C$?>pJs$r$b;}$AF@kN$H;w$F$$$k!#

3N3H$rM}2r$9kb$&0l$D$N9M$(J}$r=R$Yh&!#$=$l$O%7%s%\%k$r@0M}C*G"kH8+Jo$9J}K!$G$"$k
Dj5AO=$N0z$-=P7N0lDKF~CF$*$j!"CMO^$?JL$N0z$-=P$7$KF~$C$F$$$k… $H$$$&6q9gG"$k!#CM$N
$$$k0z$-=P$7$NCf?H$OF1$8C*$N4X?tDj5A$NF~$C$F$$$k0z$-=P$7$NCf?H$K1F6A$rM?$(k3HJ$/JQ$(k3H
$7!"5U$bF1MMG"$k!#

JQ?t **fill-column** rNcKHC$F!"CM$r;}$D%7%s%\%k$H$$$&bN$r@bL@$7F_h&!# GNU Emacs $NA4$F$
%P%C%U%!K*$$$F!"3N%7%s%\%kO"kCMK%;%C%H5l$F$$$k!#BgDq$O 72 $+ 70 G"k,!"B>NCMr;}D
$"$k!#3NCM$,2?$+$r8+$kKO3N%7%s%\%k<+?H$rI>2A$7F_lPNI$$!#b7$3$NJ8>O$r GNU Emacs $N
GFIs$G$$$kJi!"%+!<%=%k$r<!$N%7%s%\%k$ND>8e$K;}CF$$$C$F **C-x C-e** $H%?%$%W9k$@$1G"$k!#

```
fill-column
```

;d$,:# **C-x C-e** $H%?%$%W7F$_$?H3$m!" Emacs $O%(%3!<NN0h$K 72 $HI=<($7$?!#$3l,;d$,$3$NJ8>O$r=
$F$$$k;~$K **fill-column** $K%;%C%H$5lF$$$kCMG"$k!#$"J?$N Info $N%P%C%U%!$GO^$?JL$NCM$,@_Dj$5$
$$$k$+$b7l$J$$!#JQ?tH7$FI>2A$5lFJV$9CM$O!"$"$k4X?t$,L?Na$r<B9T7?;~KCMrJV$9;~$HA4$/F1$
I=<(5lk3HKCm0U7h$&!# Lisp %$%s%?%W%j%?$NN)>l$+i9kH!"IAibJVjCMG$"$k3H$K0c$$$O
Is$J<oN`$N#S<0$+$iMh$F$$$k$+$H$$$&3H$O0lC6$=NCM,J,CF7^$($P=EMWGO$J$$$N$@!#

%7%s%\%kOIsJCM$b;}$D3H$,=PMh$k!#$"$k$$$O@lLgMQ8l$r;H$C$F$$$&Ji2f!9$OJQ?t$K 72 $H$$$C$?
"such as this" $H$$$C$?J8;zNs$d!" **(spruce pine oak)** $r%P%$%s%I (*bind*) (B+G{Hb8@$&) 9k3H$,=P
Mh$k!#JQ?t$K4X?tDj5A$r%P%$%s%I9k3H9i2DG=G"$k!#

%7%s%\%kKCMr@_Dj9kKO4vD+J}K!$,$"$k!#$=$NJ}K!$N0lDK$D$$$F$O!" Section 1.9, “JQ?t$NCM$N@_
p. 11, $r;2>H$N3H!#

fill-column $H$$$&C18lKO<~jK3g8L$,$D$$$F$$$J$$$3HKCm0U7h$&!#$3lO2f!9$,$3$N%7%s%\%k$r
$NL>A0$H7F$O;H$oJ+C?$?$aG"$k!# **fill-column** $,%j%9%H$N:G=i!"b7$/$OM#0l$NMWAG$G$"$C$?>l
Lisp %$%s%?%W%j%?$O3l$KIU?o$9$k4X?tDj5A$r8+D1h&H9$k!#$7$+$7!" **fill-column** $O4X?tDj5A$r;}$
$O$$$J$$!#Nc$($P<!$rI>2A$7F_h&!#

```
(fill-column)
```

9k$H<!$Nh&$J%(%i!<%a%C%;!<%8$,=PkO$:$@!#

```
Symbol's function definition is void: fill-column
```

1.7.1 CMNJ$$%7%s%\%kKBP9$k%(%i!<%a%C%;!<%8

b7!"CM$r;}$?$J$$%7%s%\%k$rI>2A$7h&H7$?$J$i!"%(%i!<%a%C%;!<%8$,JV5lkO$:$@!# 2 $K 2 $r2C
$G<B83$7F_h&!#<!$N#S<0$NJ+$G:G=i$N 2 $ND>A0$K$"$k **+** $ND>8e$K%+!<%=%k$r;}$C$F$$$C$F **C-x C-e** $
%W7F$_$h$&!#

```
(+ 2 2)
```

<!Nh$&$J%(%i!<%a%C%;!<%8$r<u$1HkO:$@!#

```
Symbol's value as variable is void: +
```

3l$O2f!9$,8+$?:G=i$N%(%i!<%a%C%;!<%8HO0cCF$$$k!#5C$-$O ‘**Symbol's function definition is
void: this**’. $H$$$&bN$@$C$?!#:#2s$N%1!<%9GO%7%s%\%k$OJQ?t$H7FNCMr;}CF$*$i$:!"$b$&0lJ}$N
%9GO%7%s%\%k (‘**this**’ $H$$$&C18l) $O4X?tDj5A$r;}$?$J$+$C$?!#

3N **+** $r;H$C$?<B83$NCfGdC?3H$O Lisp %$%s%?%W%j%?$K **+** $rI>2A$5$;!"4X?tDj5A$G$OL5$/JQ?t$NC
5;k3HG$"$k!#$=$N$?$a$K%+!<%=%k$rA0Nh$&$K%j%9%H$r0O$`3g8L$N8e$G$OL5$/!"%7%s%\%kN9$01&N
$F$$$C$?$N$@$C$?!#7k2L$H7F Lisp %$%s%?%W%j%?$OD>A0$N#S<0!"$3$N>l9g$O **+** $=$NbN!"$rI>2A$7$?$N$@

+ $O4X?tDj5A$O;}CF$$$FbCMO;}CF$O$$$J$$$N$G!"%(%i!<%a%C%;!<%8$O%7%s%\%k$NJQ?t$H7FNCM,
$HJs9p$7$?$NG"$k!#

1.8 0z?t

I&7?$i>pJs$,4X?tKEO5lk$+$r8+k?aK!"3l$^$G2?2s$+;H$CF-$? 2 $K 2 $rB-$9Ncrb$&0lEY
h&!#

```
(+ 2 2)
```

b7$3$N#S<0$rI>2A$7$?$J$i?t;z$N 4 $,%(%3!<NN0h$KI=<(5l$k!# Lisp %$%s%?%W%j%?$,$dC?3H$O + $
B3$/?t;z$r2C$($k3HG"$k!#

+ KhCF2C$($il??t;z$O4X?t + $N 0z?t (*argument*) $H8F$Plk!#3liN?t;z$O4X?t$KM?$($ilk!
7/OEO5lk (*pass* 5l$k) >pJs$G$"$k!#

!Vargument!W$H$$$&C18l$O?t3X$G$NMQK!$+iMhF$$$kbN$G!"Fs?M$N?M$,5DO@$9kH$$$&0UL#GO$J$$!
GOJ/4X?t!":#$N>l9g$G$$$&$H + $H$$$&4X?t!"$KM?$(il$k>pJs$N3H$r;X$7$F$$$k!# Lisp NCfG$O4X
9k0z?t$O4X?t$KB3$/%"%H%`$b$7$/$O%j%9%H$G$"$k!#$3$l$i$N%"%H%`$d%j%9%H$rI>2A$7FJV5l?CM$,4X?
lk3HKJ$k!#0[$J$k4X?t$OO[Jk?t$N0z?t$r<h$jF@$k!#A4$/0z?t$r<hiJ$$4X?tb"$k!#[1]

1.8.1 0z?t$N%G!<%?7?

4X?tKEO5lk%G!<%?$N7?$O$=$N4X?t$,$IsJ<oN`$N>pJs$rI,MWH7$F$$$k$+$Khk!# + Nh$&$J4X?t$N
?tCMGJ1lPJiJ$$!#$H$$$&Nb + $O?tCM$r2C$($kL?Na$@$+iG$"$k!#B>$N4X?t$O0z?tH7$FB>$N<oN
%?$r<h$k!#

Nc$($P!" **concat** $H$$$&4X?tOFsD0J>e$N%F%-%9%H$NJ8;zNs$rO"7k$J$$$7$O9g@.$7$F0l$D$NJ8;zNs$r:n$
$N>l9g$N0z?t$OJ8;zNs$G$"$k!#FsDNJ8;zJ8;zNs **abc**, **def** $rO"7k (concatenate) 9k$H!" **abcdef** $H$$$&0
DNJ8;zNs$,=PMh$k!#3l$O<!$NNc$G3N$+ailk!#

```
(concat "abc" "def")
```

3N#S<0$rI>2A$9kH **"abcdef"** $H$$$&CM$,JV$5lk!#

substring Nh$&$J4X?t$O0z?t$H7FJ8;zNs$H?tCM$NN>J}$r<h$k!#3l$OJ8;zNs$G$"$k:G=i$N0z?t$NItJ,
NsrJV94X?tG"$k!#0z?t$N?tCM$O#3$DG"$k!#:G=i$N0z?t$OJ8;z$+iJ$kJ8;zNs$G$"$k!#FsHVL\$H;0HVL
$OItJ,J8;zNs$N=iaH=*jN>l=j$r<($9?tCMG"$j!"J8;zNs$N:G=i$+$i$N (%9%Z!<%9$d6gFIE@$b4^$a$?) J8
;XDj9k!#

Nc$($P<!$rI>2A$7F_h&!#

```
(substring "The quick brown fox jumped." 16 19)
```

substring KEO5lkJ8;zNsONc(%9%Z!<%9$G6h@Z$il?J#?t$NC18l$+iJCF$$$?H7Fb0lDN%"%H
$"$k3H$KCm0U$7h&!# Lisp OFsD$NFs=E0zMQId$N4V$K69$^lkA4Fr6uGr$b4^$a$FJ8;zNs$N0lIt$H?t$
substring $H$$$&4X?t$O0l<o$N!V%"%H%`J4:U5! (atom smasher)!W$@$H8+Jo$9$3H,=PMh$k!#$H$$$&Nb$3
DOB>$NJ}K!$G$OJ,N%$G$-$J$$%"%H%`$r<h$j9~$_!"$=$N0lIt$rCj=P9k$+$iG"$k!#$7$+$7J,$i!" **subs**
$OJ8;zNs$G$"$k0z?t$+$iItJ,J8;zNs$rCj=P$9k3H,=PMhk@1G!"B>$N<oN`$NNc$($P?tCMH+%7%s%\%k$
%H%`KD$$$FO=Nh$&$J3H$O=PMh$J$$!#

---

[1] !Vargument!W$H$$$&C18l$,Fs$D$N0[$J$k0UL#$r;}Dh$&$KJC$?7P0^$rDICF$_$kNO!"7k9=6=L#?<$$
G"$k!#0l$D$O?t3X$G$N0UL#$G$"$j!"b&0lDOF|>o;Hol$F$$$k1Q8lGN0UL#G"$k!# **Oxford Engl**
Dictionary KhkH!"3NC18l$O ‘**to make clear, prove**’ (‘L@3NK9$k!">ZL@$9$k’) $H$$$&0UL#$N
Latin 8l$+$iMh$F$$$k$H$$$&3H$@!#$=$N7k2L!"0lJ}$G$O!V>ZL@$H7FM?$($ilk>Z5r!W$+$i!VM?$($i$
Js!W$H$$$&0UL#KJ$j!"$=l, Lisp GN0UL#$NJ}$KGI@8$7$F$$$C$?!#$7$+$7!"b&0lJ}GO!VB>?M$,<
kN$HBPN)$9kh$&$J<gD%r9$k!W$H$$$&0UL#$KGI@8$7!"$=$l$,5DO@$9k3HrI=o9C18l$N0UL#$KJ
$?!# ($3$3$G3N1QC18l$,F1;~$KFsDN0[JkDj5A$r;}$C$F$$$k3H$KCm0U$7h&!#3lKBP7$F Emacs
GO!"%7%s%\%k$OF1;~$KFsDN4X?tDj5A$r;}$D3H$O=PMh$J$$!#)

1.8.2 0z?tKOJQ?tNCMd%j%9%H$b;H$($k

0z?t$OI>2A$5l?;~KCMrJV$9%7%s%\%k$G$"$k3H$b2DG=$@!#Nc$($P **fill-column** $H$$$&%7%s%\%k$=$l
$,I>2A$5l?>l9gKO!"?tCM$,JV$5lk!#3N?tCM$O2CK!1i;;$K$b;H$($k!#<!$N#S<0$N8e$K%+!<%=%k$r;}$
$F **C-x C-e** $H%?%$%W7F$_$h$&!#

```
(+ 2 fill-column)
```

JV5lkCMO **fill-column** $rC1FH$GI>2A7?>l9g$KF@$ilk?t$K 2 $r2C$($?$bNKJkO:$@!#;d$K$O 7
JV5l$k!#2?8N$J$i **fill-column** NCM, 72 G"k+i@!#

$?$C$?:#8+$?MM$K!"0z?t$OI>2A5l$?;~$KCMrJV9%7%s%\%kG"$jF@$k!#$=$l$K2C$($F!"0z?t$OI>2A5
CMrJV9%j%9%HGb$"$CFbNI$$!#Nc$($P<!$N#S<0$NCfGO4X?t **concat** $N0z?t$O **"The "**, **"red foxes."** $
7F%j%9%H **(+ 2 fill-column)** G"$k!#

```
(concat "The " (+ 2 fill-column) " red foxes.")
```

b7$3$N#S<0$rI>2A$7$?$J$i%(%3!<NN0h$K$O **"The 74 red foxes."** $,I=<($5lkO:$@!# (:G8e$NJ8;zNs$
<(5;kK$O 'The' $H$$$&C18l$N8e$H 'red' $H$$$&C18l$NA0$K6uGr$rF~$lJ1lPJi$J$$$3HKCm0U!#)
Cp!' 74 $N=j$OL^O@>l9g$K1~$8FJQo$k!#)

1.8.3 2DJQ$J?t$N0z?t

Nc$($P **concat**, **+**, ***** $H$$$C$?4v$D$+$N4X?tGO0z?t$N?t$O8GDj5l$F$$$J$$!# (***** $O>hK!$rI=o9%7%s%\
$"$k!#) 3l$O<!$K5s2k3F!9$N#S<0$rI>2A7F$_$k$HJ,$k!#%(%3!<NN0h$KI=<($5lkY-7k2LO3$N%F%
Cf$N '⇒' $N8e$K=q$+$l$F$$$k!#3l$O!V$rI>2A7?7k2L$O!W$HFI$_49$(il$k!#

:G=i$O0z?t$,$J$$>l9gG"$k!#

```
(+)       ⇒ 0

(*)       ⇒ 1
```

3AiO0lD@$10z?t$r;}CF$$$k!#

```
(+ 3)     ⇒ 3

(* 3)     ⇒ 3
```

<!GO!"3F!9;0D:$D0z?t$r;}CF$$$k!#

```
(+ 3 4 5) ⇒ 12

(* 3 4 5) ⇒ 60
```

1.8.4 4X?t$K4V0c$C$?7?$N0z?t$rM?$(kH

$"$k4X?t$K4V0c$C$?7?$N0z?t$,M?$(ilkH Lisp %$%s%?%W%j%?$O%(%i!<%a%C%;!<%8rJV9!#Nc$($P!" **+** $
4X?t$O0z?t$NCMH7$F?tCM$rMW5a9k!#<B83E*K3lK?tCMGOJ/ **hello** $H$$$&%7%s%\%k$rM?$(F_h
$N#S<0$N8e$K%+!<%=%k$r;}CF$$$C$F **C-x C-e** $H%?%$%W7F$_$h$&!#

```
(+ 2 'hello)
```

$=$&9k$H%(%i!<%a%C%;!<%8$,I=<(5l$k!#$3$N>l9g$K5/$-$?3HO3$&$@!# **+** $O 2 $K **'hello** $rI>2A$7$
lkCM$r2C$(h&H7$?!#$7$+$7JV5l$?CM$O **hello** $H$$$&%7%s%\%kG"$j?tCM$GOJ$$!#$@$,?tCMGJ$
$rB-$9$3$H$O=PMh$J$$!#$=$N$?$a$K!" **+** $O2C;;$r<B9T9k3H$,=PMh$J$+$C$?$NG"$k!#

IaDL$O%(%i!<%a%C%;!<%8$O=u1KJkh&$K!"$D$^$j$"$J$?$,0lEYFI$_J}$r=$F@$7$?8e$O0UL#$,J,$kh
G"m&H9$k!#$3$N>l9g$O

```
Wrong type argument: number-or-marker-p, hello
```

$H8@$CF/$k!#(LuCp!’ Emacs version 18 GO **integer-or-marker-p** G"$k!#Emacs version 19
$+$i$OIbF0>.?tE@?t$b07$&$h$&$KJC$?!#) %(%i!<%a%C%;!<%8$N:G=i$NItJ,$O6KaFD>@\E*$@!#‘Wrong t
argument’(0z?t$N7?$,0c$&) G"$k!#<!$KMhkN$O%_%9%F%j%"%9$J@lLgMQ8l‘number-or-marker-p’ G"$k!
3N8@MUO"J?$K + $H$$$&4X?t$,MW5a$9$k0z?t$N%?%$%W$r65$($h$&$H7F$$$k!#

number-or-marker-p $H$$$&%7%s%\%k$NL>A0$O!" Lisp %$%s%?%W%j%?$,M?$($il?>pJs (0z?t$NCM) $,?tC
(number) b7$/$O%^!<%+ (marker) (%P%C%U%!GN0LCV$rI=$o$9FC<l$J%*%V%8%'%/%H) G"k+I&$+$rH=D
k3Hr0UL#7F$$$k!#:#$N>l9g!"<B:]$K9T$&$N$O + KAcs$H2C$(kY$-@0?t$,M?$($il?$+I&$+$N%
$"$k!#$=$7$F!"%^!<%+$H8FPl$kFC<l%*%V%8%'%/%H$+I&$+$b%F%9%H5l$k!#$3lO Emacs Lisp 8GM-N
$"$k!#(Emacs NCfG$O%P%C%U%!Fb$G$N0LCV$,%^!<%+H7$F5-O?$5lk!# C-@ $"$k$$$O C-SPC $H$$$&%3%^%
KhCF%^!<%/$,%;%C%H$5lkH=$N0LCV$,%^!<%+H7$FJ];}$5lkNG$"$k!#3N%^!<%/$O?t — %P%C%U
$^$j$+$i$=$N0LCV$^$G$NJ8;z?t — $H9M$(k3H,=PMh$k!#) Emacs Lisp GO + $O%^!<%+$N0LCV$r<($9?t$r
H7$F2C$(kNKb;H$&$3H,=PMhko1G$"$k!#

number-or-marker-p NCfN ‘p’ $O Lisp %W%m%0%i%_%s%0$N=i4|$N:"$K;O$^$C$?$"$k;n$_$N6qBN2=$G$"$k!
‘p’ $O!V=R8l (predicate)!W$rI=o7$F$$$k!#=i4|$N Lisp 8&5f<T$N4V$GMQ$$$ilF$$$?@lLgMQ8lGO!V=R8
O"$kB0@-$,@5$7$$$+I&$+$rH=Dj9k4X?tN3Hr;X7F$$$?!#=>CF!" ‘p’$O **number-or-marker-p** $,
M?$($il?0z?t$,?tCM (number) b7$/$O %^!<%+G"k+I&$+$rH=Dj9k4X?t$NL>A0G"$k3H$r0UL#$
$k!#B>$N Lisp $N%7%s%\%k$G ‘p’ $G=*$okbNK **zerop** $,$"$k!#$3lO0z?t$, 0 $H$$$&CMG"k+I&$+$rH
9k4X?tG"$k!#F1MM$K **listp** $O0z?t$,%j%9%H$+$I$&$+$rH=Dj$9$k4X?t$G$"$k!#

5F!"$$$h$$$h%(%i!<%a%C%;!<%8$N:G8e$NItJ, **hello** G"k,!"3l$O + KEO5l?0z?tNCMG$"$k!#
2CK!1i;;$K@5$7$$7?$N%*%V%8%'%/%H$,M?$($ilF$$$?H9kJ$i!"EO$5lkCM$O **hello** Nh$&$J%7%s%\%k$
$/!"Nc$($P 37 Nh$&$J?tCMG"C?O:G"$k!#bCHb!"$=$N>l9g$O!"%(%i!<%a%C%;!<%8$O=P$J$$$1l

1.8.5 4X?t message

+ $HF1MM!" **message** $H$$$&4X?t$b0z?t$N?t$O8GDj$5lF$$$J$$!#3N4X?t$O%f!<%6$K%a%C%;!<%8rAwk$
$,!":#@bL@$7$?$h$&$K!"$$$m$$$mHLrKN)DbNG$"$k!#

%a%C%;!<%8$O%(%3!<NN0h$KI=<(5l$k!#Nc$($P<!$N%j%9%H$rI>2A$9k3HG!"$"$J$?$N%(%3!<NN0h$K%a%C
$rI=<($5$;$F$_$h$&!#

```
(message "This message appears in the echo area!")
```

Fs=E0zMQId$K69$^l?J8;zNsA4BN$,0l$D$N0z?t$KJCF*$j!"$=$NA4BN$,I=<(5l$k!#($3NNcG$O%a%C
$=$l<+?H$,Fs=E0zMQId$NCf$KF~$C$F$$$k3H$KCm0U$7h&!#3l$O!" **message** $H$$$&4X?t$,JV$9CM$=$Nb
$&$JCF$$$k$+$iG"$k!#$"J?$,=q$/%W%m%0%i%`NCfG$NIaDL$N **message** $N;H$$J}GO%(%3!<NN0h$KI=<
kN$OI{:nMQ$KhkbNG"$k!#$=lK$O!"Fs=E0zMQId$OIU$$$F$$$J$$!#3Nh&JNcK$D$$$F$O Section
“%$%s%?%i%/%F%#%V$J **multiply-by-seven**”, p. 22, $r;2>H$N3H!#)

7+7J$,$i!"b7 ‘%s’ $,Fs=E0zMQId$K69$^$l$?J8;zNs$KF~CF$$$?H7$?$i!"4X?t **message** $O ‘
r=N^$^I=<($7$?$jO;$:$K!"J8;zNs$KB3$/0z?t$r8+$K$$$/!#$^$:$OFsHVL\$N0z?t$rI>2A$7!"$=$N7k2L
N"$k=j$KBeF~7FI=<(9k!#

<!$N#S<0$N:G8e$K%+!<%=%k$r;}CF$$$C$F **C-x C-e** $H%?%$%W7F$_$k3H$G!"$3N3H,3N$+$ail$k!#

```
(message "The name of this buffer is: %s." (buffer-name))
```

Info NCfG$O!" **"The name of this buffer is: *info*."** $H$$$&J8$,%(%3!<NN0h$KI=<(5l$?$3H@$m
$&!# **buffer-name** $H$$$&4X?t$O8=:_$N%P%C%U%!L>$rJ8;zNs$H7FJV$9!# **message** O=lr **%s** $N0LCV$KA^
7?N@!#

CM$r 10 ?J?t$H7FI=<(9kKO!" ‘%s’ NBeojK ‘%d’ $H$$$&4X?t$rF1$8h&$K;H$&!#Nc$($P!"8=:_$N **fi
column** NCMr%(%3!<NN0h$KI=<($5$;$kKO<!$rI>2A$9lPNI$$!#

```
(message "The value of fill-column is %d." fill-column)
```

;d$N;H$C$F$$$k%7%9%F%`GO!"3N%j%9%H$rI>2A$7$?;~E@$G$O%(%3!<NN0h$K$O "The value of fill-colum is 72." $HI=<($5l?!#

b70l$D0J>e$N '%s' $,Fs=E0zMQId$G69$^$l$?J8;zNs$NCfK"C?H9kH!":G=i$N '%s' $N0LCV$KO=$NJ $KB3$/:G=i$N0z?t$NCM$,I=<($5$l!"FsHVL\$N '%s' $N0LCV$K$OFsHVL\$N0z?tNCM,I=<(5l… $H$$$&6q9gK NcH7$F<!$rI>2A7F$_$h$&!#

```
(message "There are %d %s in the office!"
         (- fill-column 14) "pink elephants")
```

$+$J$jIwJQ$ojJ%a%C%;!<%8$,I=<($5l?3H$H;W$&!#;d$N%7%9%F%`$G$O!" "There are 58 pink elephant in the office!"!#Nh$&$KI=<(5l$?!#

$3$3GO (- fill-culumn 14) $H$$$&#S<0$,I>2A$5$l!"$=$N7k2L$H7FJV5l$?CM$, '%d' $N0LCV$KA^F~$5 $k!#$=7FFs=E0zMQId$G69$^l? "pink elephants" $H$$$&J8;zNs$,0l$D$N0z?t$H7F07ol$F!" '%s' $N0 KCV+lk!# (D^$j!"Fs=E0zMQId$G64$^l?J8;zNs$O!"I>2A5l$?;~$K!"?tCM$HF1$8MMK=$l<+?HrCM 9olG$"$k!#)

:G8e$K!"C1$J$k?t$N7W;;GOJ/!"#S<0NCfK#S<0rCV-!" '%s' GCV-49$($k3H$GJ8>O$r:nkNcH$ AgCHJ#;(JbNr5s2F$*$3$&!#

```
(message "He saw %d %s"
         (- fill-column 34)
         (concat "red "
                 (substring
                  "The quick brown foxes jumped." 16 21)
                 " leaping."))
```

3NNcGO!" message $O#3$D$N0z?t$r<h$k!# "He saw %d %s" $H$$$&J8;zNs$H!" (- fill-column 32) $H $$$&#S<0$H!" concat $H$$$&4X?t$G;O$^$k#S<0$G$"$k!# (- fill-column 32) $rI>2A$7$FF@$il?7k2L$O '%d $N0LCV$KA^F~5l!" concat $+$i;O$^$k#S<0$rI>2A$7FJV5lkCM$O '%s' $N0LCV$KA^F~5l$k!#

;d$,$3$N<0$rI>2A7?H3$m!"%(%3!<NN0h$K$O "He saw 38 red foxes leaping." $H$$$&%a%C%;!<%8$,I= <($5l?!#

(LuCp!'F|K\8lNNcb5s2F$*$/!# Mule $NFbIt$G$O 2 %P%$%H%3!<%I$O 3 %P%$%H$GI=8=$5lk$?$a0lJ8;z 3 % %H$N4*Dj$KJk!#)

```
(message "H`$O %d I$$N %s $N$r8+$?!# "
         (- fill-column 34)
         (concat "@V$$ "
                 (substring
                  "$9$P$7$3$$Cc?'$N$-$D$M$,D7$s$@!# " 24 33)
                 "$,Ht$SD7$M$k "))
```

1.9 JQ?tNCMN@_Dj

JQ?tKCMr3JG<9kJ}K!$O4v$D$+$"$k!#0l$D$NJ}K!$O!" set b7$/$O setq $H$$$&4X?t$r;H$&3HG"$k $?JL$NJ}K!H7$F!" let$r;H$&$H$$$&Nb$"$k!# (Section 3.6, "let", p. 24, ;2>H). (3N%W%m%;%9N3Hr@ LgMQ8lGO!"JQ?tKCMr%P%$%s%I (B+G{) 9k$H8@$&!#)

3N8e$N%;%/%7%g%s$G$O set $H setq $NF/$-$r@bL@$9k@1GOJ$/!"0z?t$NEO5lJ}$NMM;R$b=RYk$ 9k!#

1.9.1 set $NMxMQ

%7%s%\%k flowers NCMH7F%j%9%H '(rose violet daisy buttercup) $r%;%C%H$9k?aK!"<!$N#S<0 $N8e$K%+!<%=%k$r;}$C$F$$$C$F C-x C-e $H%?%$%W7F!"3N<0$rI>2A$7F_h&!#

```
(set 'flowers '(rose violet daisy buttercup))
```

9k$H **(rose violet daisy buttercup)** $H$$$&%j%9%H$,%(%3!<NN0h$KI=<(5l$?$O$:$@!#3l$O4X?t **set**
KhCFJV5l$? (*return* 5l$?) CMG"$k!#$=$NI{:nMQH7$F%7%s%\%k **flowers** $,!"$3$N%j%9%H$K%P%$%s
lk!#D^$j!"%7%s%\%k **flowers** $O!"JQ?t$H$_$J$9$3H,=PMh$F!"$=NCM,3N%j%9%HG"kh$&$KJC$
$&$3HG$"$k!# (0x$_$K3N%W%m%;%9$O!"CM$r%;%C%H9k$H$$$& Lisp %$%s%?%W%j%?$KHCFOI{:nMQ$G$7
3H$,!"2f!9?M4V$KHCFO<g8z2L$?$j$&$k$H$$$&3H$N@bL@$KJC$F$$$k!# Lisp interpreter $O%(%i!<$,
$$8BjCMrJV9O$:$G$"$k!#7+$7!"I{:nMQ$NJ}$O!"$=Nh$&$K0U?^7J$$$H=P$J$$$bNJNG$"$k!#)

5C$-$N **set** $r;H$C$?#S<0$rI>2A7?8eGO!" **flowers** $H$$$&%7%s%\%k$rI>2A$9k3H,=PMhkh$&$K
$F$$$k!#$=$7$F!"$?C?:#!"2f!9$,%;%C%H$7$?CM$rJV$9!#<B:]$K<!$N%7%s%\%k$N8e$K%+!<%=%k$r;}CF$$$
C-e $H%?%$%W7F$_$h$&!#

```
flowers
```

flowers $rI>2A$9kH!"%(%3!<NN0h$K%j%9%H **(rose violet daisy buttercup)** $,8=$l$?$O$:$@!#

b74V0c$($FF,$K0zMQId$rIU1? **'flowers** $NJ}$rI>2A7?H9kH!"%(%3!<NN0h$K8=$lkNO3$N%7%
flowers $=$l<+?HKJ$k!#0zMQId$rIU1?dD$r<!$K5s2F$*$/NG!"I>2A7F$_$FM_$7$$!#

```
'flowers
```

b&0l$DCm0U$9Y-3H$O!" **set** $rMxMQ$9$k;~$O!" **set** $N0z?t$K$O!"$=li$rI>2A$7h&H9$k>l9g$r
$F!"I,$:0zMQIdrIU1kI,MW,$"$k$H$$$&3HG"$k!#@h$NNc$N>l9g$G$O!"0z?t **flower** 5Z$S **(rose viol
daisy buttercup)** NIAi$bI>2A$7$?$/OJ$+$C$?$N$G!"N>J}$K0zMQIdrIU1$F$$$k!# (**set** $N0lHVL\$N0z
$K0zMQId$rIU1J$+$C$?>l9g!"$^$:$^$C@h$K$=$N0z?t$,I>2A$5lk!#3l$r **flowers** KBP7FdC?H7$
$7$3$N%7%s%\%k$,$^$@CM$r;}$C$F$$$J$+$C$?$H9k$H!" '**Symbol's value as variable is void**' $H$$$&%(
%i!<%a%C%;!<%8$,I=<($5lk!#0lJ}!"b7 **flowers** $,$"kCMrJV7?H9kH!" **set** O=$$$DK"kCMr
7h$&$H9k!#L^O@3&JkN,@5$7$$F0:nG"$k>u67$b$"$k$,!"$=$&$$$&3H$O5)$G$"$k!#)

1.9.2 setq $NMxMQ

<B:]LdBjH7$F!"BgDq$N>l9g$OBh0l0z?t$K$O0zMQId$rD1k3HKJk$@$m$&!# **set** $H0zMQIdIU$-$NBh0
NAH_9go;$H$$$&NO6KaFh/;Holk?aK!"$=$lKBP7$FL>A0$,$D$$$F$$$k!#$=$l$,FC<l7A<0 **set**
$k!#$3$NFC<l7A<0$O$[$\ **set** $HF1$8JN$@$,!"Bh0l0z?t$K<+F0E*$K0zMQIdrIU1F/lk=j$@$1$,0c$&!#
$"$J$?<+?H$G0zMQIdrIU1kI,MWO$J$$!#$^$?!"$=$N3H$K2C$($F!" **setq** KO!"0lDN#S<0NCfGJ#?t$N
JQ?tKBP7$F3F!9$K0[JkCM$r%;%C%H$9k3H,=PMh$k!"$H$$$&JXMx5b$"$k!#

setq $r;H$C$F **carnivores** $H$$$&JQ?t$K **'(lion tiger leopard)** $H$$$&%j%9%H$r%;%C%H$9kK$O<!$N#S
<0$,;H$olk!#

```
(setq carnivores '(lion tiger leopard))
```

3l$O **set** $r;H$C$?$bNH!"Bh0l0z?t$K0zMQId$,IU$$$F$$$J$$$3Hr=|$-!"A4$/F1$8$G$"$k!# ('**setq**' $N
quote $r0UL#$7$F$$$k!#) **set** $r;H$&$H>e$N#S<0$O<!$Nh&KJ$k!#

```
(set 'carnivores '(lion tiger leopard))
```

$^$?!" **setq** $O0[$J$kJQ?t$N3F!9$K0[$JkCMr%;%C%H9k3H$b=PMh$k$H=q$$$?!#3N>l9gKO0lHVL\$N0
$OFsHVL\$N0z?tNCM,%P%$%s%I$5$l!";0HVL\$N0z?tKO;MHVL\$N0z?tNCM,%P%$%s%I$5$l!"$H$$$&IwKJ$
$P<!$N#S<0$r;H$&$H%7%s%\%k **tree** KO<yLZ$N%j%9%H$r!"%7%s%\%k **herbivores** KOAp?)F0J*$N%j%9%H$r%;
9k3H$,=PMh$k!#

```
(setq trees '(pine fir oak maple)
      herbivores '(gazelle antelope zebra))
```

(3N#S<0$O0l9T$G=q$$$F$b9=$o$J$$$N$@$,!"$=$&Jk$H%Z!<%8$NBg$-$5KO9goJCF7^$&!#?M4V$,FI
KO!"3&$$$&7A<0$NJ}$,FI$_d$9$$$3H,$*J,$j$$$?$@$1kH;W$&!#)

(LuCp!'0x$_$K!"F|K\8lJi<!Nh$&$KJk!#)

```
(setq <yLZ '(>> %b%_ 3_ Iv)
      Ap?)F0J* '(%,%<%k %l%$%h%& %7%^%&%^))
```

3l$^$G2?EY$+!V%;%C%H$9$k!W$H$$$&8@MU$r;H$CF-$?$1lI$b!" **set**$H$+ **setq** $NF/$-KOb&0lDN
J}$,$"$k!#$=lO **set** $d **setq** O=$N%7%s%\%k$rFCDj$N%j%9%HXN%]%$%s%HK9$k!"$H$$$&bN$@!#$3N
9M$(J}$OBgJQ0lHLE*G"$j!"$3$N8e$N>O$G!">/$J$/$H$b0l$D!"L>A0NCfK$=$N%]%$%s%?$r;}$D%7%s%\%k$K=
HKJk!#$=$&$$$&L>A0$,IU$1il$?$NO=$N%7%s%\%k$K!"$"$kCM!"hj>\$7$/$O%j%9%H!"$,%;%C%H$5$1$
aG$"$k!#b&0lDN8@$$J}GO!"$=$N%7%s%\%kO=$N%j%9%H$X$N%]%$%s%?$K@_Dj$5lF$$$k$H$$$&Iw$KI
$k!#

1.9.3 %+%&%s%H

<!NNcO!" **setq** $r%+%&%s%?$H7FMxMQ9kJ}K!$r@bL@$7F/lkbNG"$k!#$3lO!"%W%m%0%i%`NCf
$kItJ,$,2?2s8=ol$?$+$r?t$(F/lk!#$^$::G=i$KJQ?t$r 0 $K@_Dj$7!"<!$K%W%m%0%i%`$NCf$G!"$=$NItJ,
lk4H$K0l$D$:$DB-7F$$$/NG$"$k!#$=$N$?$aKO$^$:%+%&%s%?HJ$kJQ?t0l$D$K2C$(FFsD$N#S<0$
kI,MW,$"$k!#=iaK3N%+%&%s%?$r 0 $K%;%C%H$9k?aN **setq** $N<0$H!"I>2A5lk4HK$=$NJQ?t$r0l$
d9$?$a$N **setq** $N<0$G$"$k!#

```
(setq counter 0)                ; $3$l$r%$%K%7%c%i%$%6$H8F$\$&!#

(setq counter (+ counter 1))    ; $3$l$O%$%s%/%j%a%s%?$H8F$V!#

counter                         ; $3$l$O%+%&%s%?!#
```

(';' $KB3$/J8$O%3%a%s%H$G$"$k!# Section 3.2.1, "4X?tDj5A$NJQ99", p. 21, ;2>H!#)

b7:G=i$N%$%K%7%c%i%$%6$G$"$k#S<0 (**setq counter 0**) $rI>2A$7F+$i;0HVL\$N **counter** $H$$$&#S<
$rI>2A$7$?$J$i!"%(%3!<NN0h$K$O?tCM 0 $,I=<($5lk!#<!$KFsHVL\$N%$%s%/%j%a%s%?$N#S<0 (**setq counter
counter 1**)) $rI>2A$9kH!"%+%&%s%?$O0l$DA}$($k!#=>CF!"$3$3Gb$&0lEY **counter** $rI>2A$9kH%(%3!
0hKO?t;z 1 $,I=<($5lk!#$=$N8e$bFsHVL\$N#S<0$rI>2A$9k4HKCM$OA}$($F$$$/!#

%$%s%/%j%a%s%? (**setq counter (+ counter 1)**) $,I>2A$5lk$H Lisp %$%s%?%W%j%?$O:G=i$KbCHbFbIt
K"$k%j%9%H$rI>2A9k!#3N%j%9%H$rI>2A$9k?aK!"$^$: **counter**, <!$K 1 $,I>2A$5lk!#JQ?t **counte**
I>2A9k$H!"$=$N;~$NCM$,JV$5lk!#$=$l$,?t 1 HHbK **+**KEO5lFB-$79g$o5l$k!#$G!"$=NOBOFbIt
%HNCMH7F **setq**KEO5$l!"%+%&%s%?$K?7$7$$CM$,@_Dj$5lk3HKJ$k!#0J>e$Nh&K7$F!"JQ?t **cou**
NCM,JQ99$5$l$k!#

1.10 $^$H$a

Lisp $r3X$V3H$O!":G=i$NF;$,5^$J:dG"kh$&$J5VrEPkh&JbNG$"$k!#$"$J$?$,8=:_EPCF$$$
bCHb5^$JItJ,$G$"$k!#@h$K?J$`$K=>$C$F!"$h$j3Z$K?Jakh&KJkO$:$@!#

$^$Hak$H

- Lisp $N%W%m%0%i%`$O%j%9%H$b$7$/$OC10l$N%"%H%`$+iJ$k#S<0$G=PMh$F$$$k!#
- %j%9%H$O 0 0J>e$N%"%H%`b7$/$O%j%9%H$+$iJk!#3liO6uGrJ8;z$G6h@Z$ilF$*$j!"3g8L$G0O$^$
$k!#%j%9%H$NCf?H$O6u$G$"$CFbNI$$!#
- %"%H%`$O4v$D$+$NJ8;z$+$iJk%7%s%\%kG"$k!#Nc$($P **forward-paragraph** H+0lDNJ8;z$+$i$J
+!"Fs=E0zMQId$KN>B&$r64$^$l$?J8;zNs$+iJ$kJ8;zNs!"$=lK?tCMJI$,$=$&$G$"$k!#
- ?tCM$OI>2A$5lkH=$l<+?H$rJV$9!#
- Fs=E0zMQId$G64$^l?J8;zNs$rI>2A$7$?;~$b$=$l<+?HrJV9!#
- %7%s%\%k$=$NbN$rI>2A$9kH!"$=$NCM$,JV$5lk!#
- %j%9%H$rI>2A$9kH!" Lisp %$%s%?%W%j%?$O$^$:$=$N%j%9%H$N0lHVL\$N%7%s%\%k$r8+$K$$$-!"$=$N%7%s%
%P%$%s%I$5lF$$$k4X?tDj5A$r8+$k!#$=$7F=$NDj5A$NCfK"$kL?Na$r<B9T9k!#

- 0zMQId ’ $,$"kH Lisp %$%s%?%W%j%?$O$=$N8e$KB3$/#S<0$r=q$+l?$^$^$N7A$GJV$7!"Fs=E0zMQId$,L5
  9gNh$&$KI>2A7?jO7J$$$O7J$$!#
- 0z?t$O4X?t$KEO5l$k>pJs$G$"$k!#$"$k4X?tKEO5lk0z?t$O!"$=$N4X?t$r@hF,$K;}$D%j%9%H$N;D$j
  $rI>2A$7$?$bNK$"$k!#
- 4X?t$OI>2A$5l?;~$O (%(%i!<$,5/$-$J$$8B$j) >o$K$"$kCMrJV9!#$^$?!"$=$l$K2C$($F!VI{:nMQ!W$H8
  $k8z2L$r@8$:$k!#B?$/$N>l9g!"$=$N4X?t$r;H$&Bh0l$NL\E*$O$=$NI{:nMQ$r@8$8$5$;k3HK$"$k!#

1.11 N}=,LdBj

4vD+C1=c$JN}=,LdBj$r5s2F$*$/!#

- 3g8L$K64$^lJ$$E,Ev$J%7%s%\%k$rI>2A9k3HKh$j!"%(%i!<%a%C%;!<%8$rH/@8$5$;J5$$!#
- 1 GOJ/ 2 $:$DA}$($k%+%&%s%?$r:n$jJ5$$!#
- I>2A5l$?;~$K%(%3!<NN0h$K2?$+%a%C%;!<%8$rI=<($9kh$&$J#S<0$r=q$-J5$$!#

2 <B:]$NI>2A$N;EJ}

Emacs Lisp GN4X?t$NDj5A$N=q$-J}$r3X$VA0$K!"AgCH;~4V$r<h$C$F!":#$^$G=q$$$F$-$?MM!9$J#S<0
2A9kJ}K!KD$$$F=RYF$*$3$&!#$3li$N#S<0$O4X?t$r:G=i$N ($=$7F7P7$PM#0l$N) MWAGH7$F;}$D
G"$k!#4v$D$+$N%P%C%U%!$K4XO"$9$k4X?t$O!"C1=cG"k7!"6=L#?<$/$b$"$kNG!"3liN4X?t$+$i;O$
;W$&!#$^$?!"JL$N%;%/%7%g%s$G!"F1$8$/%P%C%U%!$K4XO"9kB>$N%3!<%I$K$D$$$F!"$=$li,INh&$K=q$
k+8+F_kDbj$@!#

Emacs Lisp BP7F!"%+!<%=%k$rF0$+9H$+%9%/%j!<%s$r%9%/%m!<%k9kJI$NJT=8%3%^%s%I$rM?$($k>l
>oK"J?$O (:G=i$NMWAG$,4X?t$G$"$kh&$J) $"$k#S<0$rI>2A$7$F$$$k!#3l$, *Emacs* $NF0:n$N4pK\$G$"

$"$J$?$,2?$+%-!<$r2!9H!"$=$N3H$G Lisp %$%s%?%W%j%?O"$k#S<0$rI>2A9k!#$=$&$$$&IwK7F"
5a$`7k2L$rF@kNG"$k!#$?H(%W%l!<%s%F%-%9%H$r%?%$%W7F$$$k;~Gb!" Emacs Lisp $N4X?t$rI>2A$5
$$$kNG$"$k!#3N>l9g$K8F$PlkNO **self-insert-command** G"$j!"$3lOC1K"J?$,%?%$%W7?J
$rA^F~$9kbNG$"$k!#%-!<$r2!$9$3$H$GI>2A$5lkh&$J4X?t$O%$%s%?%i%/%F%#%V (*interactive*) $J4X?t!"
$$$O!"%3%^%s%I (*command*) $H8F$Plk!#4X?t$r%$%s%?%i%/%F%#%VK9$kJ}K!$O4X?t$NDj5A$N=q$-J}$N>O$
9k3HK9$k!# Section 3.3, “4X?t$r%$%s%?%i%/%F%#%V$K9k”, p. 21, ;2>H!#

%-!<%\!<%I%3%^%s%I$r%?%$%W9kNK2C$($F!"2f!9Ob$&0l$D#S<0$rI>2A$9$kJ}K!$r3Xs@N@C?!#
%+!<%=%k$r%j%9%H$N=*C<$K;}$C$F$$$C$F **C-x C-e** $H%?%$%W9kdjJ}G"$k!#B>$N$bF1MM$K#S<0$rI>2A$
K!$,$"$k!#$=liKD$$$F$OB>$N%;%/%7%g%sG=$NETEY@bL@$9kDbj$@!#

I>2A5lkN$K;H$olk3H$K2C$($F!"<!$N4vD+$N%;%/%7%g%s$G=PF/$k4X?t$O!"$=$li=NbN,8
G"$k!#$3li$N4X?t$r3X=,9k3H$G!"%P%C%U%!$H%U%!%$%k$N0c$$$d%P%C%U%!$r@Z$jBX$($kJ}K!!"$=$7$
GN0LCVrDja$kJ}K!$K$D$$$Fh/M}2r=PMhkh$&$KJk$@$m$&!#

2.1 %P%C%U%!$NL>A0

buffer-name $H **buffer-file-name** $H$$$&FsDN4X?t$r8+$F$_$k$H!"%U%!%$%k$H%P%C%U%!$N0c$$$,h/
J,k@m&!# **(buffer-name)** $H$$$&#S<0$rI>2A$9kH!"%P%C%U%!$NL>A0$,%(%3!<NN0h$KI=<($5lk!#0lJ
(buffer-file-name) $rI>2A$9kH!"%P%C%U%!$K4XO"IU$1il$F$$$k%U%!%$%k$NL>A0$,%(%3!<NN0h$KI=<($
$k!#IaDL$O **(buffer-name)** GJV5lkL>A0$O!"$=lK4XO"IU1ilF$$$k%U%!%$%k$NL>A0$H0lCW$7F*$
(buffer-file-name) O=$N%U%!%$%k$N%U%k%Q%9$rJV$9!#

%U%!%$%k$H%P%C%U%!$O0[$J$k<oN`$NJ*G"$k!#%U%!%$%k$H$$$&NO7W;;5!$K5-O?$5lF$$$k>pJsG"$j!"
>C5n7J$$8BjO$:$C$H;D$C$F$$$kbNG"$k!#0lJ}$G%P%C%U%!$O Emacs $NFbIt$N>pJsG"$j!"$=$N;~!9
%7%g%s (LuCp!'D^$j!" Emacs $r5/F0$7$F=*N;$9k^$G) $,=*$okH (b7$/$O$=$N%P%C%U%!$r kill 9k$H)
5nCF7^$&$bNG$"$k!#IaDL$O%P%C%U%!$O%U%!%$%k$+$i%3%T!<$7$?>pJs$rJ];}7F$$$k!#3N3H$r!"%
$,$=$N%U%!%$%k$K%S%8%C%H (*visit*) 7F$$$k$H$$$&!#2f!9O3$N%3%T!<$KBP7FJT=8JI$N;E;v$r9T$&!#%P%
KBP9$kJQ99$O$=$N%P%C%U%!$r%;!<%V$9k^GO%U%!%$%k$K$OH?1G$5lJ$$!#%P%C%U%!$r%;!<%V$9kH!"%
$NFbMF$O%U%!%$%k$K%3%T!<5l$F!"$=N^$^5-O?$5lk3HKJ$k!#

b7$3$NJ8$r GNU Emacs $N Info GFIs$G$$$kNG$"$l$P!"0J2<$N#S<0$ND>8e$K%+!<%=%k$r;}$C$F$$$
C-x C-e $H%?%$%W9k3H$G!"3F!9$N<0$rI>2A$9k3H,=PMh$k!#

```
(buffer-name)

(buffer-file-name)
```

;d$,$3li$N<0$rI>2A7F$_$?H3$m!" **(buffer-name)** $rI>2A$9kH ‘**"introduction.texinfo"**’ $H$$
$&CM$,JV5l!" **(buffer-file-name)** $rI>2A$9kH ‘**"/gnu/work/intro/introduction.texinfo"**’ $,
JVCF$-$?!#A0<T$,%P%C%U%!$NL>A0$G!"8e<T$O$=$N%U%!%$%kL>$G$"$k!# (#S<0NCfN3g8L$O!" Lisp %$%s%?%
$, **buffer-name** $H **buffer-file-name** $r4X?t$H7F07CF$$$k3H$r<($7$F$$$k!#b73g8L$,L5$1lP!"
%$%s%?%W%j%?$O$=$N%7%s%\%k$rJQ?t$H7FI>2A7h$&$H7?$@$m$&!#>\$7$/$O Section 1.7, “JQ?t”, p. 6, $
>H!#)

%U%!%$%k$H%P%C%U%!$O0c$&bNG"kK$b4X$oi:!"7P7P%P%C%U%!N3Hr%U%!%$%k$H8@C?$j!"$
$N5U$r8@C?j9$k?M$OB?$$!#<B:]!"BgDq$N?M$O!V;d$O%U%!%$%k$rJT=8$7$F$$$k!W$H$$$$!"!V;d$O%U%!%$%
%V7h$&$H7F$$$k%P%C%U%!$rJT=8$7$F$$$k!WJIHO8@C?jO7J$$!#$=$lGbKXIN>l9g!">u67$+$
$$$3HODL8F7^$&!#$7$+$7J,$i7W;;5!$N%W%m%0%i%`$r07$&>l9g$O!"$=$N0c$$$r?4$KN1$aF*$/$3$
$@!#7W;;5!$O?M4VNh$&$K8-$/$O$J$$$NG"$k!#

H3mG 'buffer' $H$$$&8@MU$O>WFM$N:]$N>W7b$r5[<}9k%/%C%7%g%s$rI=$o$98@MU$+iMhF$$$k!#=i4|$
5!GO!"%P%C%U%!$O%U%!%$%k$H7W;;5!$NCf1{1i;;=hM}AuCV (CPU) $N4V$N%/%C%7%g%s$NLrL\$r7F$$$?!#%U
$rJ]B8$9$k%I%i%`$d%F!<%W$H CPU $O8_$$$KA4$/0[$kAuCVG"$j!"B.EY$bA4A30cCF$$$k!#%P%C%U%!$O3F!9
$K8z2LE*$K:n6H=PMhkh$&$K9kbN$@$C$?!#$=$N8e!"%P%C%U%!$OCf7Q$.$H$+!"0l;~E*$JJ]4I>l=jH+$$$
$iJQ2=$7$F:n6H$9$k>l=j$r<(9h$&$KJC$?!#$3$NJQ2=$O>.5J9A$+$i5pBg$JD.$X$NJQ2=$H;w$F$$$k!#$+$
$KA%$K@Q$^$l$k2_J*$,0l;~E*$KJ]4I$5lk>l=jG7$+$J$+$C$?=j$,!"%S%8%M%9$dJ82=$NCf?4H7FNB8:_$
7^C?NG$"$k!#

5F!"A4FN%P%C%U%!$,I,$:2?i+$N%U%!%$%k$K4XO"IU$1il$F$$$ko1GO$J$$!#Nc$($P **emacs** $H$$$
$N%3%^%s%I$G!"%U%!%$%k$r;XDj$;$:$K Emacs $N%;%C%7%g%s$r;Oa?>l9g!" Emacs $O '***scratch***' $H$$$&%P
%U%!$N2hLL$+$i%9%?!<%H$9$k!#$3$N%P%C%U%!$OIN%U%!%$%k$K$b%S%8%C%H$7$F$$$J$$!#F1MM$K '***Help***' $
%P%C%U%!bI$N%U%!%$%kKb4XO"IU1ilF$O$$$J$$!#

b7 '***scratch***' %P%C%U%!$K@Z$jBX$($F **(buffer-name)** $H%?%$%W$7!"$=$ND>8e$K%+!<%=%k$rCV$$$F **C-x
C-e** $H%?%$%W7F$=$N#S<0$rI>2A$7$?$J$i!" **"*scratch*"** $H$$$&L>A0$,JV$j!"%(%3!<NN0h$KI=<($5l
D^$j!"%P%C%U%!$NL>A0$O **"*scratch*"** G"$k!#7+$7!"F1$8$3Hr **(buffer-file-name)** GdC?$J
$i!"%(%3!<NN0h$K$O **nil** $HI=<($5lk!# nil $O!VL5 (nothing)!W$rI=o9%i%F%s8l$NC18l$G$"$k!#3N>l9
'***scratch***' %P%C%U%!$,$I$N%U%!%$%kKb4XO"IU1ilF$$$J$$$3Hr0UL#7F$$$k!# (Lisp GO **nil** $O!V
(false)!W$H$$$&0UL#$d!"6u$N%j%9%HG"$k **()** $NF10U8l$H7F$b;H$olk!#)

$D$$$G$K8@$CF*$/$H!"b7$"$J$?$,!" '***scratch***' %P%C%U%!$K$$$F!"$"$k#S<0$,JV$9CM$r%(%3!<NN0h$G
$/ '***scratch***' %P%C%U%!$=$NbN$KI=<($7$?$$>l9g$O!" **C-x C-e** NBeojK **C-u C-x C-e** $H%?%$%W9l$PNI
$$!#3&9k$H!"CM$O#S<0N9$08e$KI=<(5l$k!#B($A%P%C%U%!KO<!Nh$&$KI=<(5l$k!#

```
(buffer-name)"*scratch*"
```

3l$O Info NCfG$O<B9T=PMh$J$$!#$H$$$&Nb Info %P%C%U%!OFI_=P7N$_ (read-only) G"$j!">!<j$K%
%U%!$NCf?H$r=$@5$7$?$j9k3H$O=PMh$J$$$+iG$"$k!#7+$7!"JT=82DG=$J%P%C%U%!G"lP!"IN%P%
$"$m$&$H<B9T=PMh$k!#%3!<%I$dJ8=q (Nc$($P3N%^%K%e%"%kJs$+) $r=q$$$F$$$k;~KO!"3N5!G=$OBgJQ
$"$k!#

2.2 %P%C%U%!$N3MF@

buffer-name $H$$$&4X?t$O%P%C%U%!$NL>A0rJV9!#=>CF!"%P%C%U%!$=$NbN$r<h$j=P9K$O!"JL$N4X
I,MWKJ$k!#$3lO **current-buffer** $H$$$&4X?tG"$k!#%3!<%I$NCfG3$N4X?t$r;H$&$H!"%P%C%U%!$=$N
$,F@$ilk!#

L>A0$H!"$=$NL>A0$,D$$$F$$$k%*%V%8%'%/%H$J$$$7$O<BBN$H$O!"8_$$$K0[JC$F$$$k!#$"$J$?$O$"$J$?$N
$O0c$&!#$"$J$?$O!"B>$N?M$+i=$NL>A0$G8FPl$k0l?M$N?M4VG"$k!#$b7"J?$, George HOC7$?$$$HN
;~$K!" 'G', 'e', 'o', 'r', 'g', 'e' $H$$$&J8;z$N=q$+l?%+!<%IrEO5l?H7$?$i!"$"$J$?$OLLGr$$$H$O;W$&$
7l$J$$$,!"K\Mh$NMW5a$OK~$?$5lJ$$!#$"$J$?$OL>A0HOC7$?$$$H$$$&NGOJ$/!"$=$NL>A0$r;}$D?M4
$?$$$N$@$+$i!#%P%C%U%!$b$=$l$HF1$8$@!#%9%/%i%C%A%P%C%U%!$NL>A0$O '***scratch***' G"$k!#7+$7!"$=$N
$O%P%C%U%!$=NbNGOJ$$!#$H$$$&3H$G!"%P%C%U%!$=NbNr<h$j=P$9H-$O!" **current-buffer** $N
$J4X?t$,I,MWJo1G$"$k!#

7+7J$,$i!";v>pOb$&>/$7J#;(G"$k!#Nc$($P **current-buffer** r9$08e$G<B83$9$kh&$K!"#S<0$
$GI>2A$7$?$H9k!#$=$&9k$H!"%P%C%U%!$NCf?HGOJ/!"%P%C%U%!$NL>A0$N$_$,I=<(5l$k!# Emacs $,$
$&$KF0:n9kNKOFsD$NM}M3$,$"$k!#$=$N%P%C%U%!$O2?@i9T$b$"$k$+$b7l$J$$ — 3l$O<j7Z$KI=<(=P
$$$&bNGO$J$$!#$=$7$FB>$N%P%C%U%!$G!"L>A0$O0cCF$bCf?H$OF1$8$bN,$"$k$+$b7l$J$$!#$=$li
kN$O!"BgJQBg@Z$J3HG"$k!#

5F!"3l$,$3$N4X?t$r4^$`#S<0$G$"$k!#

(current-buffer)

b7!"4/IaDLK3$N#S<0$rI>2A7?H9kH!"%(%3!<NN0hKO '#<buffer *info*>' Nh$&$KI=<(5l$k!
Nh$&$KFC<l$JMM<0$GI=<(9k3H$G!"%P%C%U%!$NL>A0GOJ/!"$=$N%P%C%U%!<+?H$,JV$5l?3H$r<($
NG$"$k!#

$D$$$G$K8@$&$H!"%W%m%0%i%`$NCfKO?tCM$d%7%s%\%k$r%?%$%W$9k3HO=PMhk,!"I=<(5l$F$$$k%P%
$D$$$FO=sJ3H$O=PMh$J$$!#%P%C%U%!$r<h$j9~$`M#0l$NJ}K!$O current-buffer Nh$&$J4X?t$r;H$&$
JNG"$k!#

4XO"9k4X?t$K other-buffer $H$$$&N,$"$k!#3l$O!":#!"8=:_$$$k%P%C%U%!!"D^$j%+%l%s%H%P%C%U
=|$$$FbCHb:G6aA*Br7?%P%C%U%!rJV9!#b7D>A0$K '*scratch*' %P%C%U%!$K9TCF5"CF$-$?H7$
other-buffer $O!"$3$N%P%C%U%!$rJV$9!#

3N3H$O<!$N#S<0$rI>2A$9k3HG3N$+$ail$k!#

(other-buffer)

%(%3!<NN0hKO '#<buffer *scratch*>' b7$/$O!"$"$J$?$,:G6a9TCF5"CF$-$?%P%C%U%!$NL>A0$,I=<($
$?$O$:$@!#

2.3 %P%C%U%!4V$N0\F0

other-buffer $H$$$&4X?tO3lr0z?tH9$k4X?t$+$i8F$Pl?>l9gKO<B:]K=$N%P%C%U%!$NCf?H$rDs
$k!#$3lO other-buffer $H switch-to-buffer $r;H$C$FB>$N%P%C%U%!$K@Z$jBX$($k3H$G3N$+ailk!#

$,!"$=$NA0$K!" switch-to-buffer $H$$$&4X?t$r4JC1$K>R2p7F$*$3$&!# Info %P%C%U%!$+$i (buffer-name) $rI>2A$9k?aK '*scratch*'%P%C%U%!$K9T$CFLaCF/$k:]$K!"B?J,$"$J$?$O$^$: C-x b $H%?%$
$7!"$=7F%_%K%P%C%U%!KI$N%P%C%U%!$K0\$k$+?R$M$k%W%m%s%W%H$,=P$?;~$K '*scratch*' $H%?%$%W7?$N
$J$$$@m&$+!#$3$N;~$N%-!<%9%H%m!<%/ C-x b $O Lisp %$%s%?%W%j%?KBP7$F%$%s%?%i%/%F%#%V$K Emacs L
$N4X?t switch-to-buffer $rI>2A$5$;$F$$$kNG$"$k!#A0Kb8@C?h&$K Emacs O3Nh$&$K7FF0:n
$F$$$k!#$^$?JL$N%-!<%9%H%m!<%/$O$^$?JL$N4X?t$r8F$S=P$7$?$jAvi;$?$j9k!#Nc$($P C-f $O forward-c
$r8F$S=P$9$7!" M-e $O forward-sentence$r8F$S=P$9!"$H$$$C$?46$8G"$k!#

#S<0NCfG switch-to-buffer $H=q$$$F!"$=$$$D$K0\$kY-%P%C%U%!$rM?$(kH!" C-x b $HA4$/F1$8$h$&
7F%P%C%U%!$r@Z$jBX$($k3H$,=PMh$k!#

$3$3K=$N#S<0$r5s2F$*$/!#

(switch-to-buffer (other-buffer))

switch-to-buffer $H$$$&%7%s%\%kO3$N%j%9%H$N:G=i$NMWAG$G$"$k$+$i!" Lisp %$%s%?%W%j%?$O!"$3$$$
$r4X?t$H7F07$$!"$=$l$KDj5A$5lF$$$kL?Na$r<B9T$9$k!#$7$+$7!"$=$NA0$K!"FbIt$K3g8L$K64$^l? o
buffer $,$"k3HrH/8+$7!"$3Ai$r@h$K2r<a9k!# other-buffer $O!"$3$N%j%9%H$N:G=i$N ($=7F3
9g$OM#0l$N) MWAGG"k+$i!" Lisp %$%s%?%W%j%?O3$N4X?t$rAvi;$k!#$9kH$3$$$DOJLN%P%C%U%!$rJ
<!$K%$%s%?%W%j%?OJVCF-$?%P%C%U%!$r switch-to-buffer $K0z?t$H7FEO7F!"3N4X?trAvi$;$k!
$&$7$F Emacs $OB>$N%P%C%U%!$K@Z$jBXok!#b7!"3NJ8=q$r Info GFIs$G$$$kJiAaB.;n7F$_$h$&!
#S<0$rI>2A$9kNG"$k!# (La$CF/kK$O!" C-x b RET $H%?%$%W9k!#)

8e$NJ}$N%;%/%7%g%s$K=P$F$/$k%W%m%0%i%_%s%0NNcG$O switch-to-buffer hj$b set-buffer $H$$$&4X
?t$NJ}$rhjB?$/8+$+1k$@$m$&!#$3lO7W;;5!$N%W%m%0%i%`$H?M4V$N0c$$$Khk!#?M4V$OL\$r;}$A:#:n6
$k7W;;5!$NC<Kv$N>e$K$=$N%P%C%U%!$r8+$?$$$H;W$&$bNG$"$k!#3l$O$$$&$^$GbJ$/Ev$?$jA0$N3HG
$+$7J,$i!"%W%m%0%i%`$OL\$r;}$?$J$$!#%W%m%0%i%`$,%P%C%U%!$r07$C$F$$$k;~KO!"%P%C%U%!$O%9%/%j!
$($F$$$J$/$?CFNI$$$NG"$k!#

switch-to-buffer $O?M4V$N$?$a$K@_7W$5lF$*$j!"FsDN3H$r9T$&!#0lDO Emacs $,Cm0U$r8~1
$$$k%P%C%U%!$r@Z$jBX$($k3HG"$j!"$b$&0l$D$O2hLL$K8+$($F$$$k%P%C%U%!$r@Z$jBX$($k3HG"$k!#
set-buffer $NJ}$O0lDN;E;v7+7J$$!#C1$K7W;;5!$,Cm0U$r8~$1$F$$$k%P%C%U%!rJLN%P%C%U%!$K@Z$j
k@1G$"$k!#2hLL$K8+$($F$$$k%&%#%s%I%&O=N^$^$@ (L^O@!"IaDLO=$N%3%^%s%I$,=*N;9k$^$G$O2
iJ$$!#)

$3$3G^$?JL$N@lLgMQ8l$r>R2p$7h&!#8F$S=P$9 (*call*) $H$$$&8@MUG"$k!#:G=i$N%7%s%\%k$,4X?t$G$"$
%H$rI>2A$9kH!"$=$N4X?t$,8F$S=P5l$k!# (call 5l$k!#) 3N;~$N8F$S=P9H$$$&C18l$N;H$$J}$O!"!V8
$9!W$3HG<BBNH7FN4X?t$,2?$+rdCF$/$lk3H+iMhF$$$k — K\J*$NG[4I9)$r!V8F$S=P$9!W$H?e
D>7F$/$lkN$H0l=o$G$"$k!#

2.4 %P%C%U%!$N%5%$%:$H%]%$%s%H$N0LCV

:G8e$K!"4JC1$J4X?t$r4v$D$+8+$F$_$h$&!# **buffer-size**, **point**, **point-min**, $=$7$F **point-max** G"$k!#
3liO%P%C%U%!$N%5%$%:H=NCfG$N%]%$%s%H$N0LCV$N>pJs$rM?$(F/lkbNG"$k!#

buffer-size $H$$$&4X?t$O8=:_$N%P%C%U%!NBg-5r65$($F$/$l$k!#$D$^$j!"$=$N%P%C%U%!NCfNJ8;z$N
JV9NG"$k!#

    (buffer-size)

3l$r$$$DbNh&$K!"#S<0$N:G8e$K%+!<%=%k$r;}CF$$$C$F **C-x C-e**$H%?%$%W$9k3HGI>2A7F$_$h$&

Emacs NCfG$O8=:_$N%+!<%=%k$N0LCV$O%]%$%s%H$H8FPl$k!# **(point)**$H$$$&#S<0$O%P%C%U%!$N;O$^$j$
%]%$%s%H$^GNJ8;z?trJV9!#$=$lKhCF8=:_$N%+!<%=%k$N>l=j$,J,$k!#

<!$N#S<0$r3N%P%C%U%!NCfG$$$DbDLj$KI>2A$9lP%]%$%s%H$^GNJ8;z?t$,J,$k!#

    (point)

3l$r=q$$$F$$$kH-KO!" **point** NCMO 121905 G"C?!#3N **point** $H$$$&4X?t$O!"$3$N%^%K%e%"%k$
$NJ}$K=PF/$k4v$D$+$NNcNCfG$OIQHK$K;Hol$k!#

L^O@%]%$%s%H$NCM$O%P%C%U%!$NCfGN0LCV$K0MB8$7$F$$$k!#<!$N>l=j$G%]%$%s%H$rI>2A9l$P!"$=NCMO
hjbBg-$/$JCF$$$kO:G"$k!#

    (point)

;d$N>l9g$3$N>l=j$G$N%]%$%s%HNCMO 122376 G"C?!#3l$ON>J}$N#S<0$N4V$K (6uGr$b4^$a$F) 471 J8;z
3H$r<($7$F$$$k!# (LuCp!' Mule GO!"FbItE*$K%^%k%A%P%$%HJ8;z$N@hF,$K%j!<%G%#%s%0%-%c%i%/%?rIU
$&$N$G!"Nc$($P 2 %P%$%HJ8;z0lDO 3 %]%$%s%H$K?t$($ilk!#)

point-min $H$$$&4X?tOAgC$H **point** $K;w$F$$$k$,!"$3Ai$O%+%l%s%H%P%C%U%!Cf$N%]%$%s%H$NCM$NC
5v5l$k:G>.$NCMrJV9!#3NCM$O%J%m!<%$%s%0 (*narrowing*) $,M-8z$KJC$F$$$J$$8B$j 1 $H$$$&?tCMG"
(%J%m!<%$%s%0$H$$$&NO!"$"$J$?<+?H$b7/$O%W%m%0%i%`$NA`:n$r%P%C%U%!N"$kItJ,$K@)8B7F7^$&
AHG"$k!#>\$7$/$O Chapter 6, “%J%m!<%$%s%0$H%o%$%I%K%s%0”, p. 53, $r;2>H$N3H!#) F1MM$K!" **point-ma**
$H$$$&NO%+%l%s%H%P%C%U%!Cf$N%]%$%s%HNCMNCf$G5v$5lk:GBgNCMrJV$9!#

2.5 N}=,LdBj

$"$J$?$,:n6H7F$$$k%U%!%$%k$r0l$D3+$$$F!"$=$NCf1{JUj^$G9T$-J5$$!#$=$7$F!"$=$N%P%C%U%!L>!"
%kL>!"D9$5!"5Z$S%U%!%$%k$NCfGN0LCV$rD4$YJ5$$!#

3 4X?tDj5A$N=q$-J}

Lisp %$%s%?%W%j%?$,%j%9%H$rI>2A$9$k>l9g!"$^$:%j%9%H$N:G=i$N%7%s%\%k$,4X?tDj5A$r;}$C$F$$$k$+$I
JL$N8@$$J}r9kH%7%s%\%k$+$i4X?tDj5AXN%]%$%s%?$,$"$k$+$r8+$K$$$/!#b7$=$&G"lP!"7W;;5!$
5A$K4^$^lkL?Na$r<B9T$9$k!#4X?tDj5A$r;}$D%7%s%\%k$N3H$rC1$K4X?t$H8@$&!# ($?$@$7!"@53N$K$ODj5A
JNG"$j!"%7%s%\%k$O$=$l$r;X$7$F$$$k$@$1G"$k!#)

A4FN4X?t$O C 8@8l$G=q$+$l$?>/?t$N %W%j%_%F%#%V (*primitive*) $J4X?t$r=|$$$F!"JL$N4X?t$r;HCFDj5A
$F$$$k!#4X?t$r=q$/>l9gKO$=$l$r Emacs Lisp $r;H$C$F=q$-!"B>$N4X?t$rItIJH7$F;H$&3HKJ$k!#$
$,;H$&4X?tO=$l<+?H ($"J?$,=q$$$?bN$r4^$a$F) Emacs Lisp $G=q$+l?bN$+$b7l$J$$$7!" C $G=
l?%W%j%_%F%#%VJbN+b7lJ$$!#%W%j%_%F%#%V$J4X?t$b Emacs Lisp $G=q$+lF$$$kNbNHA4$/F1
$&$K;Hol!"F1$8$h$&$K?6Iq$&!#$3li$, C $G=q$+lF$$$kNO!"==J,$JG=NO$r;}$A!" C rAvi$;$k3H
kI$N7W;;5!$G$b4JC1$K GNU Emacs $,F0$/h&K9k?aG$"$k!#

:FEY6/D4$7$F$*$/1lIb!" Emacs Lisp $N%3!<%I$r=q$/>l9g!" C $G=q$+l?4X?t$r;H$&>l9g$H Emacs Li
$G=q$+l?4X?t$r;H$&>l9gHG6hJLrD1kI,MW$OA4$/$J$$!#0c$$$OA4$/L5;k$7$F9=$o$J$$!#;d$,$3$N6h
Hr=q$$$?NO!"C1KCNC$F$$$?J}$,LLGr$$$+iG$"$k!#<B:]!"D4::Gb7J$$8B$j!"4{$K=q$+$1$F$$$k
Emacs Lisp $G=q$+lF$$$k$+ C $G=q$+lF$$$k$+$OH=CG=PMh$J$$!#

3.1 FC<l7A<0 defun

Lisp GO **mark-whole-buffer** Nh$&$J%7%s%\%kKO!"$=$N4X?t$,8F$Pl?;~$K7W;;5!$,2?r9Y-$+$r
$($k%3!<%I$,IU?o$7$F$$$k!#3N%3!<%IN3Hr 4X?tDj5A (*function definition*) $H$$$$!"%7%s%\%k **defun** $G
$^$k#S<0$rI>2A$7$?;~$K:nil$k!# ($3lO *define function* $NN,$G$"$k!#) **defun** $ODL>o$HOJLN0z?t$NI>
$N;EJ}$r9k$?$a$K!"FC<l7A<0 (*special form*) $H8F$Plk!#

3N8e$KB3$/4vD+$N%;%/%7%g%s$G$O!"Nc$($P **mark-whole-buffer** Nh$&$K Emacs $N%=!<%9%3!<%I$NCf$
$i4X?tDj5A$r8+$F$$$/3HK9$k!#$,!"3N%;%/%7%g%sGObC$HC1=c$J4X?tDj5A$r@bL@$7!"$=$l$,$Is
N+$r!"$^$:M}2r$7Fbi&3HK7h&!#4JC1JNcK9k$?$a$K;;?t$K$D$$$FNNcK9k!#;;?t$r;H$C$
$$$J?MC#$b$$$kHO;W$&$,!"$"$J$?$,$=$&$@$H7Fb,C/j/kI,MWO$J$$!#3NF~Lg=q$N;D$j$K=P$F$
$N%3!<%I$K$O;;?t$H$+?t3X$O=PF3$J$$!#=PF/kNcO!"BgBN$,2?$,7+$N0UL#$G%F%-%9%H$K4X$okbNG

4X?tDj5A$O **defun** $H$$$&C18l$KB3$1$F!"<!$Nh&$J:GBg8^$D$NItJ,$r2C$($?bNG"$k!#

1. 4X?tDj5A$,IU$1il$k%7%s%\%k$NL>A0!#
2. 4X?tKEO5lk0z?t$N%j%9%H!#$b$70l$D$b0z?t$rD1$J$$>l9g!"$3$3$O6u%j%9%H () K9$k!#
3. 4X?t$r@bL@$9$kJ8>O!# (5;=QE*$K$O>JN,2DG=$G$"$k$,!"=q$/3H$,6/$/K>$^$l$F$$$k!#)
4. >JN,2DG=!#3N4X?t$r%$%s%?%i%/%F%#%VK9$k!"$D$^$j **M-x** $KB3$1$F4X?tL>$r%?%$%W$9k+!"E,Ev$J%
   $$$7$O%-!<%3!<%I$r%?%$%W$9k3HG;H$&$3H,=PMhkh$&$K9k$?$a$N#S<0$r=q$/!#
5. 7W;;5!$K2?$r9Y$-$+$rL?Na$9$k%3!<%I$r=q$/!#B($A!"4X?tDj5A$NK\BN$G$"$k!#

3N4X?tDj5A$N8^$D$NItJ,$N3F!9$K%9%m%C%H$r3dEvFF!"<!Nh$&$J%F%s%W%l!<%HK7$F@0M}$7F*$/$
D@m&!#

```
(defun function-name (arguments...)
  "optional-documentation..."
  (interactive argument-passing-info) ; >JN,2DG=
  body...)
```

0lDNNcH7$F!"0z?t$K 7 r+1k4X?t$N%3!<%I$r5s2k!# (3NNc$O%$%s%?%i%/%F%#%VGO$J$$!#
tion 3.3, "4X?t$r%$%s%?%i%/%F%#%VK9$k", p. 21, $r8+$h!#)

```
(defun multiply-by-seven (number)
  "Multiply NUMBER by seven."
  (* 7 number))
```

3NDj5A$O3g8L$H **defun** $H$$$&%7%s%\%k$G;O$^$j!"4X?t$NL>A0$,B3$$$F$$$k!#

4X?t$NL>A0$N<!KO3N4X?tKEO5lk0z?t$N%j%9%H$,Mh$k!#$3$N%j%9%H$O0z?t%j%9%H (*argument list*) $
Pl$k!#:#$N>l9g!"3N%j%9%H$NMWAG$O **number** $H$$$&%7%s%\%k0lD@1G$"$k!#3N4X?t$,;H$olk;~$
3N%7%s%\%k$O4X?t$N0z?tH7$F;H$olkCMKP%$%s%I$5lk!#

0z?t$NL>A0$H7F **number** $H$$$&C18l$rA*$VBeoj$KB>$NL>A0$rA*$sGbNI$$!#Nc$($P **multiplicand** $H
$&C18l$GbNI+C?!#;d$, ‘number’ $H$$$&C18l$rA*$s$@$N$O!"$3$N%9%m%C%H$KI&$$$&<oN`NCM,MW5a5
$,J,$k$+$iG"$k!#$7$+$7!"3N%9%m%C%HKCV+lkCM$,$3$N4X?t$NF/$-$NCfGI$&$$$&Lr3d$r2L$?9+$
$$$&0UL#$G ‘multiplicand’ $H$$$&C18l$rA*$VNb0-$/$J$+$C$?!# **foogle** H7Fb9=oJ$$$,!"3l$ONI$$A
$@$H$O;W$($J$$!#3lGO2?N3H+J,iJ$$!#I&$$$&L>A0K9k+$O%W%m%0%i%^<!Bh$@$,!"4X?t$N0UL
K9kh$&$JbN$,A*$PlkY-G"$k!#

<B$N=j!"0z?t%j%9%H$NCf$N%7%s%\%k$KOIsJL>A0GbA*V3H,=PMh$k!#$?H(!"B>$N4X?t$NCf$G;H$o
$k%7%s%\%kL>$G$"$CFbNI$$$NG"$k!#0z?t%j%9%H$NCf$G;H$olkL>A0$O!"$=$NFCDj$NDj5ANCf@1G7
$J$$%W%i%$%Y!<%H$JbNG"k+i@!#3NDj5ANCfG$O!"B>$NIs$J4X?tDj5A$NCfK"$kF1$8L>A0$N%7%
$b0[$J$k<BBN$r;X9NG"$k!#Nc$($P!"$"J?$,2HB2$N4VGO ‘Shorty’ $H$$$&%K%C%/%M!<%`rD1ilF$
7h$&!#$3$N>l9g!"$"J?$N2HB2$NC/$+$, ‘Shorty’ $H$$$&>l9gKO!"$=$lO"J?N3Hr;X7F$$$k!
7"J?$N2HB20J30$N=j!"Nc$($P1G2hNCfJIG$O ‘Shorty’ $H$$$&NOJL$NC/$+$r;X$7$F$$$k!#0z?t%j%
Cf$NL>A0$O$=$N4X?tNCf@1GDLMQ9kbNJN$G!"$3$N4X?t$NK\BN$NCf$G$=$N%7%s%\%kNCMrI&JQ$($
$b30$GNCMK$O2?$N1F6AbJ$$$H$$$&o1$@!#;w$?h&$J8z2L$, **let** $r;H$C$?#S<0$N>l9gGb8+il$k!#
tion 3.6, “**let**”, p. 24, ;2>H!#)

0z?t%j%9%H$N<!$K$O!"4X?t$K$D$$$F$N@bL@$G$"$k!"@bL@J8;zNs$,Mh$k!#3l$O**C-h f** $KB3$1F=$N4X?t$NL
%?%$%W$7$?;~$KI=<(5l$kFbMF$G$"$k!#$D$$$G$K8@$CF*$/$H!"$"$J$?$,@bL@J8;zNs$r=q$/>l9gKO!":G=
$O407k$7$?0l$D$NJ8$K9Y$-$G$"$k!#$H$$$&Nb!" **apropos** Nh$&$J4vD+$N%3%^%s%I$OJ#?t9TKEOC$F=
$?@bL@J8$NJ8;zNsN&AN:G=i$N0l9T$@$1$7$+I=<($7$J$$$+iG$"$k!#$^$?!"Fs9TL\$b=q$/>l9g$O3l$r%
%H9Y$-$GOJ$$!#2?8NJi!" **C-h f** (**describe-function**) $r;H$C$?$H$-$KJQ$JI=<($N5l$+$?r9$k+
G"$k!#@bL@J8;zNs$O>JN,2DG=GO$"$k$,!"BgJQLr$KN)DbNJNG!"4X?t$r=q$/:]KOJkY$/=q$/h
$-$G$"$k!#

5C$-$NNcGN;09TL\$O4X?tDj5A$NK\BN$rJ7$F$$$k!# (IaDL$N4X?tDj5A$OL^O@3lhjbC$HD9$$!#)
9g!"3NK\BN$O **(* 7 number)** $H$$$&%j%9%HG"$j!" *number* NCMK 7 r+1k3HrDja$F$$$k!# (Emac
Lisp GO ***** $O3]$1;;$rI=$o$94X?t$G$"$k!#F1MM$K **+** $OB-$7;;$rI=$o$9!#)

multiply-by-seven $H$$$&4X?t$r;H$&>l9g!"0z?t **number** O"J?$,<B:]$K;H$$$?$$$CM$KI>2A$5lk!#<
NNcG$O **multiply-by-seven** $N;H$$J}$r<($7$F$$$k!#$?$@$7!"$^$@$3lrI>2A7J$$$h$&$K!*

```
(multiply-by-seven 3)
```

<!$N%;%/%7%g%s$G>\$7$/=R$Yk,!":#NNcG$O%7%s%\%k **number** $K 3 $H$$$&CM$,M?$(il$?!"$J$$$7$O!V%
%I5l$?!W$o1G$"$k!# **number** $O4X?tDj5A$N3g8LNCfK$"$k$,!" **multiply-by-seven** $H$$$&4X?tKEO5$
$k0z?t$O3g8L$N30$K$"$k3H$KCm0U$7F*3&!#4X?tDj5ANCfK3g8L$,$"kN$O!"7W;;5!$,0z?t$N%j%9%H$
=*oj!";DjNItJ,$,2?=h$+$i;O$^k+rCNk$?$aK"kNG"$k!#

3NNc$rI>2A$9kHB?J,%(%i!<%a%C%;!<%8$,=P$k$@$m$&!# (;n$7F_h&!*) 3l$O!"2f!9$O3N$+$K4X?t
=q$$$?N@$,!"$^$@$=$NDj5A$r7W;;5!KEA($F$$$J$$ — D^$j!"$^$@ Emacs K3$N4X?tDj5A$r%$%s%9%H
(b7$/$O%m!<%I) 7F$$$J$$ — $?$aG"$k!#%$%s%9%H!<%k$N;EJ}$K$D$$$F$O<!$N%;%/%7%g%s$G@bL@$9$k!#

3.2 4X?tDj5A$N%$%s%9%H!<%k

b7 Emacs $N Info NCfG3lrFIs$G$$$kNJ$i!"@h$K4X?t$NDj5A$rI>2A$7!"<!$K **(multiply-by-seve
3)** $rI>2A$9k3HG!" **multiply-by-seven** $H$$$&4X?t$r;n$7F_k3H,=PMh$k!#$3$N2<$K4X?tDj5A$N<
$r=q$$$F$*$/NG!"$=$ND>8e$K%+!<%=%k$r;}CF$$$C$F **C-x C-e** $H%?%$%W7h$&!#$=$&$9kH!"%(%3!<N
multiply-by-seven$HI=<($5lk!# (3l$O4X?tDj5A$rI>2A7?;~KJV9CMO=$N4X?t$NL>A0G"k3H
7F$$$k!#) F1;~$K!"$3$&$9k3HG4X?tDj5A$,%$%s%9%H!<%k5l$k!#

```
(defun multiply-by-seven (number)
  "Multiply NUMBER by seven."
  (* 7 number))
```

3N **defun** $rI>2A$9k3HG!"$?$C$?:# Emacs $K **multiply-by-seven** $,%$%s%9%H!<%k5l$?!#:#$GO3$N
4X?t$O **forward-word** d"J?$,JT=8$K;H$&B>$N4X?t$HA4$/F1MM!" Emacs $N0lIt$G$"$k!# (**multiply-by-seven** O"J?$, Emacs $r=*N;$9k^$G%$%s%9%H!<%k5l$?$^$^$KJC$F$$$k!#3N%3!<%I$r Emacs $r5
9k$?$S$K:F%m!<%I$9$kJ}K!$K$D$$$F$O!" Section 3.5, "%3!<%I$r$:$C$H%$%s%9%H!<%k7F$*$/KO", p. 24,
8+$h!#)

multiply-by-seven $r%$%s%9%H!<%k7?3HGI$&$JC?$+$O!"<!NNcrI>2A9k3H$G8+$k3H$,=
$k!#%+!<%=%k$r<!$N#S<0$ND>8e$K;}$C$F$$$C$F **C-x C-e** $H%?%$%W7Fh&!#%(%3!<NN0hKO 21 $H$$$&?t;
<(5l$?$O$:$@!#

```
(multiply-by-seven 3)
```

b7K>$`$J$i!" **C-h f** (**describe-function**) $KB3$1F3$N4X?t$NL>A0 **multiply-by-seven** $r%?%$%W$9
k3HG!"3N4X?tDj5A$N@bL@$rFI$`$3Hb=PMh$k!#$=$&$9kH!" '***Help***' $H$$$&%&%#%s%I%&$K<!$Nh&$
5l$k!#

```
multiply-by-seven: Multiply NUMBER by seven.
```

(%9%/%j!<%s$r85$N0lDN%&%#%s%I%&KLa9KO!" **C-x 1** $H%?%$%W9l$PNI$$!#)

3.2.1 4X?tDj5A$NJQ99

multiply-by-seven NCfN%3!<%I$rJQ99$7$?$$>l9g$O!"C1$K$=$l$r=q$-D>9@1G$"$k!#8E$$$bNr?7$
%P!<%8%g%sKCV-49$($kKO!"$=$N4X?tDj5Arb$&0lEYI>2A$9lPNI$$!#3l$, Emacs NCfN%3!<%I$r=$(
J}K!G"$k!#6K$a$FC1=c$@!#

NcH7$F!" **multiply-by-seven** $H$$$&4X?t$r 7 r+1kNGOJ$/!"$=$N?t<+?H$r 7 2s2C$(kbNKJQ
9k3H$,=PMh$k!#7k2LH7FOF1$8Ez$($,F@$ilk1lIb!"ESCf$NF;6Z$O0cCF$$$k!#F1;~$K%3!<%I$
%a%s%H$r2C$(h&!#3l$O Emacs KOL5;k5lk1lI$b!"?M4V$,FI$`>l9gKOJXMx$@J"H+2rjd9
;W$&$O$:$@!#:#2s$O!"$3l,FsHVL\$N%P!<%8%g%sG"kH$$$&%3%a%s%H$r=q$$$F$*$/3HK9$k!#

```
(defun multiply-by-seven (number) ; FsHVL\$N%P!<%8%g%s
  "Multiply NUMBER by seven."
  (+ number number number number number number number))
```

%3%a%s%H$O%;%_%3%m%s ';' $N8e$KB3$$$F$$$k!# Lisp GO!"%;%_%3%m%s$N8e$KB3$/A4$FNbNO%3%a%s%
$k!#9T$N=*oj$,%3%a%s%H$N=*ojKJ$k!#Fs9T0J>e$KEOCF%3%a%s%H$r=q$-$?$$>l9g$O3F!9$N9T$r%;%_%
;Oak!#

Section 16.3, "'.emacs' $N=q$-J}", p. 142, 5Z$s Section "Comments" in *The GNU Emacs Lisp Reference Manual*, $K%3%a%s%H$K$D$$$F!"hj>\$7$/@bL@$5lF$$$k!#

:#$N%P!<%8%g%s$N **multiply-by-seven** 4X?t$r%$%s%9%H!<%k9kKO:G=iNbNr%$%s%9%H!<%k$7$?;~$
$/F1$8h&K7$FI>2A$7FdlPNI$$!#D^$j!"%+!<%=%k$r:G8e$N3g8L$N$9$08e$K;}$CF-$F **C-x C-e** $H%
9l$PNI$$$NG"$k!#

$^$Hak$H!" Emacs $G%3!<%I$r=q$/J}K!$O<!NDLjG"$k!#$^$:$O4X?t$r=q$-!"%$%s%9%H!<%k$7!"%F%9%
$_$k!#$G!"IT6q9g$r=$@5$7$?$j3HD%7?j7$F:FEY%$%s%9%H!<%k9k$H$$$&6q9g$@!#

3.3 4X?t$r%$%s%?%i%/%F%#%VK9$k

4X?t$r%$%s%?%i%/%F%#%VJbNK9kKO!"FC<l7A<0 **interactive** $G;O$^$k%j%9%H$r@bL@J8;zNsN9$0
CV1P$h$$!#%$%s%?%i%/%F%#%V$J4X?t$O%f!<%6!<$, **M-x** $KB3$1$F4X?t$NL>A0$r%?%$%W9k3H$G8F$S=P$
$,=PMh$k!#$"$k$$$O!"$=$N4X?t$K%P%$%s%I7?%-!<$r%?%$%W7Fbh$$!#Nc$($P!" **C-n** $H%?%$%W9k$H **n**
line $,8F$Plk$7!" **C-x h** $H%?%$%W9k$H **mark-whole-buffer** $,8F$Plk!#

LLGr$$$3HK!"%$%s%?%i%/%F%#%V$J4X?t$r%$%s%?%i%/%F%#%V$K8F$S=P9H!"JV5lkCMO<+F0E*KO%(%3
$KI=<($5lJ$$!#3l$O%$%s%?%i%/%F%#%V$J4X?t$O7P7P!"C18lJ,$d0l9TJ,A0$K?Js@j9kJINI{:
E*$K8F$VNG$"$C$F!"JV$5lkCMN3HO5$$K7J$$$+iG$"$k!#b7%-!<$r%?%$%W9k4H$K%(%3!<NN0
I=<(5l$?$i!"?oJ,$H15F+$7$$$3H@m&!#

FC<l7A<0 `interactive` $r;H$$$D$D%(%3!<NN0h$KCM$rI=<($9$kJ}K!$K$D$$$F@bL@9k$?$a$K!" `multiply-by-seven` $N%$%s%?%i%/%F%#%V%P!<%8%g%s$r:n$CF_h&!#

3l$,$=$N%3!<%I$G$"$k!#

```
(defun multiply-by-seven (number) ; %$%s%?%i%/%F%#%V%P!<%8%g%s
  "Multiply NUMBER by seven."
  (interactive "p")
  (message "The result is %d" (* 7 number)))
```

3N%3!<%I$O%+!<%=%k$r%3!<%IN9$08e$K;}CF$$$C$F **C-x C-e** $H%?%$%W9k3H$G%$%s%9%H!<%k=PMh$k!
sH!"3N4X?t$NL>A0$,%(%3!<NN0h$KI=<($5l?$@$m$&$+!#<!$+$i3N%3!<%I$r;H$&KO!"$^$: **C-u** $KE
?t$r%?%$%W$7!"$=$N8e$K **M-x multiply-by-seven** $H%?%$%W7F **RET**$r2!$;$PNI$$!#%(%3!<NN0h$K!" 'The result is ...' $H$$$&J8$KB3$$$F7W;;7k2L$,I=<($5lkO:$@!#

bC$H0lHLE*$K8@$&$H!"3Nh&$J4X?t$O<!$NFsDL$jNFbIAi$+$NJ}K!$G8F$S=P$9$3H,=PMh$k!#

1. $^$:EO5lkY$-?t$r4^$`A0CV0z?t$r%?%$%W$9$k!#$D$$$G **M-x** $H4X?tL>$r%?%$%W$9$k!"Nc$($P **C-u 3 forward-sentence**!"H9$k!#
2. $"$k$$$O!"$=$N4X?t$K%P%$%s%I5l$?%-!<$J$$$7$O%-!<%3!<%I$r%?%$%W$9$k!#Nc$($P **C-u 3 M-e**!#

:#5s2?FsDNNcGO!"IAiN>l9g$b%]%$%s%H$,#3$D$NJ8$@$1A0J}$K0\F0$9$k!# (3N4X?trNcH7F0
M3$O!" `multiply-by-seven` OI$N%-!<Kb%P%$%s%I5lFO$$$J$$$N$G!"%-!<%P%$%s%G%#%s%0NNcH7F$
$($J$$$+iG$"$k!#)

(%3%^%s%I$r%-!<$K%P%$%s%I$9$kJ}K!$K$D$$$F$O Section 16.7, "4v$D$+$N%-!<%P%$%s%G%#%s%0", p. 145, $r
>HN3$H!#)

A0CV0z?t$r%$%s%?%i%/%F%#%V$J4X?t$KEO9K$O!" **M-3 M-e** Nh$&$K **META** %-!<$KB3$1$F?t$r%?%$%W9kJ
$H!" **C-u 3 M-e** Nh$&$K **C-u** $KB3$1$F?t$r%?%$%W$9$kJ}K!$H$,$"$k!# ($b$7 **C-u** $N8e$K2?$b?t$r%?%$%W$
$+$C$?>l9g!"%G%U%)%k%H$G$O 4 $,EO$5lk!#)

3.3.1 %$%s%?%i%/%F%#%V$J `multiply-by-seven`

%$%s%?%i%/%F%#%V%P!<%8%g%s$N `multiplyo-by-seven` NCfNFC<l7A<0 `interactive` $N;H$$J}$H!"4X?t
`message` $r8+$F$_$h$&!#$b$&0lEY$3$N4X?t$NDj5A$r=q$$$F$*$/!#

```
(defun multiply-by-seven (number) ; %$%s%?%i%/%F%#%V%P!<%8%g%s
  "Multiply NUMBER by seven."
  (interactive "p")
  (message "The result is %d" (* 7 number)))
```

3N4X?tNCfG$O#S<0 `(interactive "p")` OFsD$NMWAG$+iJ$k%j%9%HG"$k!# `"p"` $O Emacs $KBP$7!"
3N4X?t$KA0CV0z?t$rEO$7!"$=NCMr4X?t$N0z?t$H7F;H$&$3HrCNi;k?aNbNG"$k!#

0z?t$O?t$KJk!#3l$O `number` $H$$$&%7%s%\%k$,

```
(message "The result is %d" (* 7 number))
```

$H$$$&9TNCfG$"$k?t$K%P%$%s%I5lkH$$$&0UL#G"$k!#Nc$($P!"A0CV0z?t$, 5 $@$H9k$H!" Lisp %$%s%
%?O3$N9T$r<!Nh$&$KI>2A9k3HKJ$k!#

```
(message "The result is %d" (* 7 5))
```

(b7!"3NJ8>O$r GNU Emacs NCfGFIsG$$$kJi!"3N#S<0r"J?<+?H$GI>2A$9k3H,=PMh$k!#
=i$K%$%s%?%W%j%?$OFbIt$K$"$k%j%9%H$rI>2A$9$k!#:#$N>l9g$O (* 7 5) G"$k!#$3lOCM 35 rJV9!#<!K
B&$N%j%9%H$,I>2A5l$k!#$D$^$j!"FsHVL\5Z$S;D$j$NMWAG$NCM$, message $H$$$&4X?tKEO5lk!#

A0$K8+$?h&$K!" message OFCK0l9T$N%a%C%;!<%8$r%f!<%6KAwk$?aN Emacs Lisp $N4X?t$G$"$C$?
(Section 1.8.5, “4X?t message”, p. 10, ;2>H!#) <jC;$K8@$&$H!"4X?t message $O:G=i$N0z?t$r%(%3!<NN0h$K
I=<(9kN@$,!" ‘%d’, ‘%s’, 5Z$S ‘%c’ $@$1$ONc30$G!"3liN@)8fJ8;zNsNFbNIl$+$,8=l?;~$O!";D$j
HVL\0J9_$N0z?t$r=g$K8+$K9T$-!"$=NCMr3li,$"$k>l=j$KA^F~$7$FI=<($9$k!#

multiply-by-seven $H$$$&4X?tGO!"@)8fJ8;zNsH7$F ‘%d’ $,;H$o$l!"$3lO?t$rMW5a$9$k!#:#$N>l9g
i=NCMO (* 7 5) $rI>2A$7FJV5l? 35 $H$$$&?tG"$k!#$=$N7k2L!" ‘%d’ $N>l=j$K$O 35 $,I=<($5$l!"%
%;!<%8$O ‘The result is 35’ HJko1G$"$k!#

($3$3$GCm0U$@$,!" multiply-by-seven $H$$$&4X?t$r8F$s$@>l9g!"%a%C%;!<%8$O0zMQIdL5$7$GI=<(5l$
7+$7 message r=N^^8Fs$@>l9gKO!"Fs=E0zMQId$G0O$^lF$$$k!#3l$O message $,JV$9CM$=$Nb
message $,@hF,$K$"$k#S<0$rI>2A$7$?>l9g$K%(%3!<NN0h$KI=<($5lkbN$G!"$3lK$O0zMQId$,$D$$$F$$$
$,!"$3l,B>$N4X?t$NCfKKda9~$^$l$F;HMQ$5l?>l9g!"I=<(5lkbNO message $,I{:nMQ$H7F=PNO$
NG!"3lKOFs=E0zMQId$,$D$$$F$$$J$$$+iG$"$k!#)

3.4 interactive $NB>$N%*%W%7%g%s

>eNNcG multiply-by-seven $O interactive $N0z?t$H7F "p"$r;H$C$F$$$k!#3N0z?t$,$"$k>l9g!"
Emacs O"J?$,!" C-u$KB3$1$F?t$r%?%$%W9k$+!" Meta %-!<$KB3$1$F?t$r%?%$%W9k$+$7$F!"$3$N%3%
%I$K0z?t$H7F?trEO9bN$H2r<a$9$k!# Emacs O3Nh$&$J interactive $N0z?t$r 20 <oN`0J>eMQ0U$7
$$$k!#BgDq$N>l9g!"$3li$N%*%W%7%g%s$NFbK"J?$,K>$`DLjN>pJs$r4X?t$KEO9bN,0lD+FsDO$
$@!# (Section “Code Characters for interactive” in *The GNU Emacs Lisp Reference Manual*, ;2
>H!#)

Nc$($P ‘r’ $H$$$&J8;z$N>l9g!" Emacs O=$N4X?tK=$N;~$N%j!<%8%g%s$N:G=i$H:G8e$N0LCV ($=$N;~$N%]
%H$H%^!<%/$NCM) rFsD$NJL!9$N0z?tH7$FEO$9!#;H$$J}ONc(P3sJIw$@!#

```
(interactive "r")
```

$"$k$$$O!" ‘B’ G"lP!" Emacs $O%P%C%U%!$NL>A0$rJ9$$$F$-$F!"F~NO7?CMr=$N4X?t$KEO$9!#$b$&>
7/8@$&$H!" Emacs $O%_%K%P%C%U%!$K%W%m%s%W%H$r=P$7$F!"%f!<%6!<$KL>A0$rMW5a$9$k!#$3$N;~$N%W%m%s%
$O ‘B’$KB3$/CM$,;HolkN$G!"Nc$($P!" "BAppend to buffer: " H+=q$$$F$*$/!# Emacs $O?$@C1$K%W%m
%s%W%H$r=P$9$@$1GOJ/$F!"H=CG=PMh$kJ,$@$1$NF~NO$,$"$l$P!" TAB %-!<$r2!$9$3HGJd40$^$G7F$/$

4X?tKFsD0J>e$N0z?t$rEO7?$$>l9g!" interactive $KB3$1$FJ#?t$NJ8;zNsrIU12C$($k3H$G!"3F!9
?t$K>pJs$rEO$9$3H,=PMh$k!#$3$N>l9g$=$N>pJs$O!"3F!9$N0z?t$K interactive $K=q$$$?NHF1$8=g=x$G
lk!#IU$12C$($kJ8;zNs$O!"3F!9$NItJ,$r ‘\n’, B($A2~9T%3!<%I$G6h@Z$k!#Nc$($P "BAppend to buffer: "
B3$1$F ‘\n’ $H ‘r’ $r=q$$$?j9$k!#$3$&$9kH!" Emacs $O%W%m%s%W%H$G%P%C%U%!L>$rMW5a$9kHF1;~$K%]
%H$H%^!<%/$NCMb=$N4X?t$KEO7F$/$l$k — ;0$D$N0z?tA4$FrEO7F/lkNG$"$k!#

3N>l9g$N4X?tDj5A$O<!Nh$&$J7A<0KJ$k!# buffer, start, 5Z$S!" end $O interactive $,%P%C%U%!$H
$=$N;~$N%j!<%8%g%s$N;O$^$j$H=*$ojr%P%$%s%I$9$k%7%s%\%k$G$"$k!#

```
(defun name-of-function (buffer start end)
  "documentation..."
  (interactive "BAppend to buffer: \nr")
  body-of-function...)
```

(%W%m%s%W%H$N%3%m%s$N8e$N6uGr$O!"%W%m%s%W%H$r=P$9;~$N8+1I$(rh$/$9k?aNbNG"$k!# append-
buffer $H$$$&4X?tO^5K3Nh&KJCF$$$k!# Section 4.4, “append-to-buffer $NDj5A”, p. 38, ;2
>H!#)

$"$k$$$O!"b7>e$K5s$2$?$h$&$JFCDj$NJ8;z$Khk0z?t$NM?$(J}$,$"J?$NL\E*$K9goJ$$>l9g!"$"$J$? 0z?t$r%j%9%HH7$F **interactive** KEO9$3Hb2DG=G"$k!# Section “Using **Interactive**” in *The GNU Emacs Lisp Reference Manual*, K3$N>e5i%F%/%K%C%/$K$D$$$Fhj>\$7$$$3H,=q$+$l$F$$$k!#

3.5 %3!<%Ir:CH%$%s%9%H!<%k$7F*$/$K$O

4X?tDj5A$rI>2A$9k3HG0lC6$=$N4X?t$r%$%s%9%H!<%k9k$H!" Emacs $r=*N;$9k^G=$N4X?t$O%$%s% %k$5l?$^$^KJCF$$$k!#0lJ}!"<!$K Emacs $N?7$7$$%;%C%7%g%s$r3+;O$7$?;~$O!"$=$N4X?tDj5A$r:FEY k^G=$N4X?t$O%$%s%9%H!<%k$5lJ$$!#

$"$k;~E@$G!" Emacs $N?7$7$$%;%C%7%g%s$r;O$a$k;~$K<+F0E*$K%$%s%9%H!<%k7?$$$H;W$&$+b7lJ$$! $O4v$D$+$"$k!#

- b7!"<+J,<+?H$G=q$$$?%3!<%I$,$"lP!"$=$N4X?tDj5A$N%3!<%I$r$"$J$?$N=i4|2=%U%!%$%k ‘**.emacs**’ $K=q$-9~$`!#$=$&$9kH Emacs $r5/F0$7$?;~$K3N ‘**.emacs**’ $H$$$&%U%!%$%k$,<+F0E*$KI>2A$5lF! NCfK=q$+$l$?A4$F$N4X?t$,%$%s%9%H!<%k$5lk!# Chapter 16, “‘**.emacs**’ %U%!%$%k”, p. 141, ;2>H!#
- $"$k$$$O!"%$%s%9%H!<%k$7$?$$4X?t$NDj5A$r0lDN%U%!%$%k!"$b7/$O4X?t$4HKJ#?t$N%U%!%$%k$K $*$-!" **load** $H$$$&4X?t$r;H$C$F Emacs K=lrI>2A5;F=li$N4X?t$r%$%s%9%H!<%k$9kH$$$& b"$k!# Section 16.8, “%U%!%$%k$N%m!<%I”, p. 146, ;2>H!#
- $^$?!"$"$J$?$N$$$k%5%$%HA4BN$G$=$N%3!<%I$r;H$$$?$$>l9g$O!"IaDL$O$=$N4X?t$r ‘**site-init.el**’ 8 lk%U%!%$%k$K=q$$$F$*$/!#3N%U%!%$%k$O Emacs $r:n@.$9$k;~$K<+F0E*$K%m!<%I$5lk!#3&9 $G!"$"J?$N7W;;5!$r;H$&A4$F$N?M$,$=$N4X?t$rMxMQ=PMh$kh&KJ$k!# (Emacs distribution $NCf ‘**INSTALL**’ %U%!%$%k$r;2>H$N3H!#)

:G8e$K!"$b7"J?$, Emacs $r;H$&A4FN?M$,M_$7$/$Jkh$&$J%3!<%I$r=q$$$?Ji!"$=$N%3%T!<$r% %o!<%/>e$K%]%9%H7?$j!" Free Software Foundation KAwk3H$,=PMh$k!# ($=$&9k>l9gKO!"I&$+%] %H$9$kA0$K%3!<%I$K copy left $NCm0U=q$-$rE:IU$7$FM_$7$$!#) %3%T!<$r Free Software Foundation KAwC$? >l9g!"<!$N Emacs $N%j%j!<%9;~$KO=lr4^aFG[I[5lk+b7lJ$$!#BgBNK*$$$F!"$3$3?tG/O3$ $J4sIU$KhC$F Emacs $,@.D9$7F-$?$NG"$k!#

3.6 let

let <0$O!" Lisp GOB?$/$N4X?tDj5ANCfGI,MWHJ$kFC<l7A<0G"$k!#Hs>oKh$/;H$olkbNJN$G! %;%/%7%g%sNCfG **let** KD$$$F@bL@9k3HK9$k!#

let $O!"%7%s%\%k$KCM$r%P%$%s%I9k:]$K!" Lisp %$%s%?%W%j%?$,$=$N4X?t0J30$N4X?tNCfG;HolF $8L>A0$NJQ?t$H:.F1$7$J$$$h$&$K9k$?$a$K;HMQ$5lk!#2?8N3s$J4X?t$,I,MWJN$+$H$$$&3H$rG<F aK!"<!NMMJ>u67$r9M$(h&!#$"J?$O<+J,<+?H$N2H$r;}CF$$$F!"$=$l$r!V2H!W$H8FsG$$$kH9$ $P!"!V$=m=$m2H$K$b%Z%s%-EI$j$,I,MW$@J"!W$H$$$&Iw$K;H$&o1G"$k!#$7$+$7!"$"$J$?$,M’?MBp$rK $=$3$N%[%9%H$N?M$,!V2H!W$H8@C?>l9g!"BgDq$=$lO"J?$N2H$GOJ$/H`$N2H$N$3$H$r;X$7$F$$$k!#B($ !V2H!W$H$$$&8@MU$G8@5Z$5$l$F$O$$$F$bJL$N$b$N$J$o$1$G$"$k!#$b$7H`$,H`<+?H$N2H$N3H$r8@$C$F$$$F! $,$"J?<+?H$N2H$r;W$$Ib$+$Y$F$$$?Ji:.Mp7F7^$&$3HG$"$m$&!#F1$8$3$H$, Lisp KD$$$F$b8@$($k4X?t$G;Hol$F$$$kJQ?t$HF1$8L>A0$NJQ?t$,B>$N4X?t$G$b;H$olF$$$F!"7+b=NFsD$,F1$8CM$r;}$ 4|BT5lFO$$$J$$;~G"$k!#

let $H$$$&FC<l7A<0$r;H$&3HG3Nh$&$J:.MprKI0$3$H$,=PMh$k!# **let** $O %m!<%+%kJQ?t (*local variab* $H8F$PlkbN$rH/@8$5$;$k!#3l$O!"$=$N **let** <0$N30K"$kF1$8L>A0$NJQ?t$+iO3VN%5l$F$$$kJQ? $k!#K,Ld@h$N%[%9%H$N?M$,!V2H!W$H$$$&;~$OH`$OH`<+?H$N2H$r;X$7$F$$$kNG$"$C$F!"$"J?$N2H$r;X7 GO$J$$$N$H;w$?h&JbN@!# (0z?t%j%9%HNCfN%7%s%\%k$bF1$8h&$JF/$-r9$k!# Section 3.1, “FC<l **defun**”, p. 19, $r8+$h!#)

let <0KhCFH/@8$7$?%m!<%+%kJQ?tNCM,J];}5l$F$$$kNO!"$=$N **let** <0NCf@1G$"$k!# ($=$7$ NCfN#S<0O=$N **let** <0$NCf$@$1$G8F$Plk!#) =>CF!"%m!<%+%kJQ?tO=$N **let**<0$N30KOA4$/1F6A$rM $$!#

let $O0lEY$KJ#?t$NJQ?t$rH/@8$5$;k3H,=PMh$k!#$^$?!" **let**$O3F!9$NJQ?t$K=i4|CM$r@_Dj$9$k!#$"$
;XDj9lP=NCMKJk$7!"$=$&$7J1lP **nil** $,@_Dj$5lk!#(@lLgMQ8lGO!"3N3H$r!V$=$NJQ?t$
%P%$%s%I$9$k!W$H8@$&!#) **let** $OJQ?t$rH/@8$5$;!"$=$lKCMr%P%$%s%I$7$?8e!"K\BN$N%3!<%I$r<B9T$7!"K\
$N:G8e$N#S<0NCMrJV$9!#(<B9T (Execute) 9k$H$$$&NO!"%j%9%H$rI>2A$9kH$$$&0UL#$N@lLgMQ8l$G$
3lO3$NC18l$N!V<B<AE*$J8z2L$rM?$($k (to give practical effect to)!W$H$$$&0UL#GN;H$$J}$+$iMh$F$$
(*Oxford English Dictionary*)!#$"$J$?$O$"$kF0:n$r0z$-5/$3$9$?$a$K#S<0$rI>2A7F$$$kN@$+$i!"3N>l
!V<B9T!W9k$H$$$&NOI>2A9kNHF15AG"m&!#)

3.6.1 let <0$N9=@.ItJ,

let $H$$$&#S<0$O;0$D$NItJ,$+iJ$k%j%9%H$G$"$k!#:G=i$NItJ,$O%7%s%\%k **let** G"$k!#FsHVL\$NItJ,
?t%j%9%H (*varlist*) $H8F$Plk%j%9%HG"$j!"3F!9$NMWAG$O%7%s%\%k$=NbNG$"$k$+!":G=i$NMWAG$,%7%s%
$"$kFsDNMWAG$+$iJk%j%9%HG"k+NIAi$+$G$"$j!";0HVL\$NItJ,$O **let** <0$NK\BN$G$"$k!#K\BNIt
Dq!"0lDJ$$$7$OJ#?t$N%j%9%H$+$iJk!#

let <0$N%F%s%W%l!<%H$O<!Nh$&$K=q1k!#

```
(let varlist body...)
```

JQ?t%j%9%HNCfN%7%s%\%k$OFC<l7A<0 **let** <0$KhC$F=i4|CM$r@_Dj5l$kJQ?t$G$"$k!#C1FH$N%7%s%\%k$=
$N>l9g$O!"=i4|CM **nil** $,@_Dj$5lk!#$^$?!":G=i$NMWAG$,%7%s%\%kG"kh$&$JFsDNMWAG$+$iJk%j%9
9g!"$=$N:G=i$N%7%s%\%k$KBP7F Lisp %$%s%?%W%j%?$,FsHVL\$NMWAG$rI>2A$7$?;~$KJV5lkCM,@_Dj5l$

$H$$$&o1$G!"JQ?t%j%9%H$O **(thread (needles 3))** $H$$$&46$8$N<0KJ$k!#$3$N>l9g$@$H!" **let** <0$NCf$
Emacs $O%7%s%\%k **thread**$r=i4|CM **nil** $K!"%7%s%\%k **needles** $r=i4|CM 3 $K%P%$%s%I9k!#

let <0$r=q$/>l9gK9k3HO!"E,@Z$J#S<0$r **let** <0$N%F%s%W%l!<%H$NCfKCV/3HG"$k!#

b7!"JQ?t%j%9%H$,Fs$DMWAG$N%j%9%H$+iJ$k>l9g!"$H$$$CFbBgDqO=$&$JN@$,!" **let** <0$N%F%s%W
$O<!$Nh&KJ$k!#

```
(let ((variable value)
      (variable value)
      ...)
  body...)
```

3.6.2 let <0$NNc

<!$N#S<0$OFsDNJQ?t **zebra** $H **tiger** $rH/@8$5$;!"$=lKBP7F=i4|CM$rM?$($F$$$k!# **let** <0$NK\BN$O4
message $r8F$S=P$9%j%9%H$G$"$k!#

```
(let ((zebra 'stripes)
      (tiger 'fierce))
  (message "One kind of animal has %s and another is %s."
           zebra tiger))
```

$3$3$G!"JQ?t%j%9%H$O **((zebra 'stripes) (tiger 'fierce))** G"$k!#

FsDNJQ?t$O **zebra** $H **tiger** G"$k!#3F!9$NJQ?tOFsD$NMWAG$+iJ$k%j%9%H$N:G=i$NMWAGG"$j!"$=
O=$N%j%9%H$NFsHVL\$NMWAGKJCF$$$k!# Emacs $OJQ?t%j%9%H$NCf$G **zebra** $r **stripes** $K%P%$%s%I$7
$^$?!" **tiger** $r **fierce** $K%P%$%s%I7F$$$k!#3N>l9g!"CM$ON>J}$H$b0zMQId$N$D$$$?%7%s%\%kG"$k!#CM
O@!"B>$N%j%9%H$dJ8;zNsG"CF$b9=$o$J$$!# **let** <0$NK\BN$OJQ?t$r4^$`%j%9%H$N8e$KMh$k!#:#$N>l9g$O
4X?t **message** $r;H$C$?%j%9%H$G$"$j!"%(%3!<NN0h$KJ8;zNs$rI=<(9k!#

$$$DbNh&$K%+!<%=%k$r:G8e$N3g8L$ND>8e$KCV$$$F **C-x C-e** $H%?%$%W9k3H$G>e$NNc$rI>2A$9k3$
Mh$k!#$=$&$9kH!"%(%3!<NN0h$K<!$Nh&$KI=<($5lk$@$m$&!#

```
"One kind of animal has stripes and another is fierce."
```

0JA08+$?$h$&$K!"message 4X?t$O:G=i$N0z?t$r '%s' $r=|$$$FI=<(9k!#:#$N>l9g!":G=i$N '%s' $N=j$K$OJ
zebra NCM,I=<(5l!"FsHVL\$N '%s' $N=j$K$OJQ?t tiger NCM,I=<(5l$k!#

3.6.3 let <0$NJQ?t@k8@$NCf$G=i4|CM$r@_Dj7J$+$C$?>l9g

b7!"let <0NCfGJQ?t$KFCDj$N=i4|CM$r%P%$%s%I7J$+$C$?$H9k$H!"$=liNCMO<+F0E*$K nil $K%
%I5l$k!#<!$NNc$r8+$F$_$h$&!#

```
(let ((birch 3)
      pine
      fir
      (oak 'some))
  (message
   "Here are %d variables with %s, %s, and %s value."
   birch pine fir oak))
```

$3$3$G!"JQ?t%j%9%H$O ((birch 3) pine fir (oak 'some)) G"$k!#

3N#S<0$r$$$DbNDLjKI>2A7?Ji!"%(%3!<NN0hKO<!Nh$&$KI=<(5lk@m&!#

```
"Here are 3 variables with nil, nil, and some value."
```

3N>l9gKO Emacs $O%7%s%\%k birch $K 3 $H$$$&?t$r%P%$%s%I$7!"%7%s%\%k pine $H fir KO nil $r%P%
%s%I$7!"99$K%7%s%\%k oak KO some $r%P%$%s%I7F$$$k!#

let <0$N:G=i$NItJ,$G!"JQ?t pine $H fir $OC1FH$N%"%H%`G"$j!"3g8L$G0O$^$lFO$$$J$$$3HKCm0
h&!#3l$O!"$3li$NJQ?t$r nil, B($A6u%j%9%H$K%P%$%s%I$9k?aG$"$k!#7+$7!"oak $NJ}$O!"som
%P%$%s%I$9kN$G!"%j%9%H (oak 'some) $N0lIt$HJC$F$$$k!#F1MM$K!"birch $b 3 $K%P%$%s%I9kNG!"
$N?t$H0l=o$N%j%9%H$KF~CF$$$k!# (?tCM$OI>2A$5l?;~K=$l<+?H$NCMrJV9NG!"0zMQIdOI,MWJ$$!#
message NCfK3N?t$rI=<($9$k:]$O!"'%s' GOJ/$F!"'%d' $r;H$C$F$$$k!#) $=$7$F!"$3li;MDNJQ?
RHDN%0%k!<%WH7$F%j%9%H$NCf$KF~$j!"let <0$NK\BN$H6hJL5l$F$$$ko1G"$k!#

3.7 FC<l7A<0 if

defun $H let $KB3$/;0$DL\$NFC<l7A<0$O!">r7oJ,4t (conditional) if G"$k!#$3$NFC<l7A<0$O7W;;5!K
si$+$NH=CGr5$;$k;~$K;H$olk!# if $r;H$oJ/Fb4X?tDj5A$r=q$/3H$b=PMh$k$,!"IQHK$K;H$&$b$N
$7!"=EMW$Gb"kN$G!"$3$3$K4^ak3HK9$k!#$3lONc$($P!"beginning-of-buffer $H$$$&4X?t$NCf
;Hol$F$$$k!#

if $NGX8e$K$"$k4pK\E*$J9M$(J}$O!V$b$7(if)!"%F%9%H$7$?7k2L$,??Ji$P(then) #S<0$rI>2A9k!W$H$$
N@!#%F%9%H7?7k2L$,??$GJ1lP!"#S<0$OI>2A$O5l$J$$!#Nc$($P!"!Vb7!"CH$+$/$FB@M[$,=P$F$$$
%S!<%A$X9T$3$&!#!W$H$$$&h&$JH=CG$r9kh&JbN@!#

Lisp $G=q$+lk if <0GO!"'then' $H$$$&C18l$O;H$olJ$$!#%F%9%H$H<B9T$O if $r:G=i$NMWAGH9$k%j%
$NFsHVL\$H;0HVL\$NMWAGG"$k!#$K$b4X$oi:!"if <0$N%F%9%HItJ,$O *if-part* $H8F$P$l!"FsHVL\$N0z?t$O *t*
part $H8F$Plk3H$,B?$$!#

$^$?!"if <0$,=q$+lk>l9g!"??$+56$+$N%F%9%H$OIaDL!"if $HF1$89T$K=q$+lk!#7+$7!"%F%9%H$,??$
$?>l9g$K<B9T5l$k "then-part" $OFs9TL\0J9_$K=q$+$l$k!#$3$&$9k3HG!"if <0$,$hjFI_d9$$$b$N
$k!#

(if *true-or-false-test*
    action-to-carry-out-if-test-is-true)

??56%F%9%H (true-or-false-test) $NItJ,$O List %$%s%?%W%j%?$KhjI>2A5l$k#S<0$G$"$k!#

<!$K$$$DbNh&K7$F<B9T=PMh$kNc$r5s$2F*$/!#%F%9%HItJ,$O 5 $, 4 hjbBg-$$$+I&$+$rH=CG$9
$@!#$=$&$G$"$l$P!"'5 is greater than 4!'$H$$$&%a%C%;!<%8$,I=<($5lk!#

```
(if (> 5 4) ; if-part
    (message "5 is greater than 4!"))   ; then-part
```

(4X?t > $O:G=i$N0z?t$,FsHVL\$N0z?thjbBg-$$$+I&$+$rH=CG$7!"$=$&$G$"$l$P??$rJV9bNG$"$k!#)

L^O@!"<B:]$K;H$&>l9gKO!" if <0$N%F%9%HItJ,$O>o$K (> 5 4) $K8GDj$5lF$$$?jO7J$$!#$=$NBeo >/J/Hb0lDNJQ?t$,!"A0$bCFJ,iJ$$CM$K%P%$%s%I5l$k!# ($b$7!"A0$bCFCM$,J,$C$F$$$kJi!" 9kI,MWJI$J$$!*)

Nc$($P!"$=$NCM$O4X?tDj5A$N0z?t$K%P%$%s%I5l$?$j9k!#<!$N4X?tDj5A$G$O!"4X?t$KEO5lkCMOF0J G"$k!#$b$7!" **characteristic** $K%P%$%s%I5lkCM, **fierce** G"lP!" ‘**It’s a tiger!**’ $H$$$&%a%C %;!<%8$,I=<($5lk!#$=$&GJ1l$P!" **nil** $,JV$5lk!#

```
(defun type-of-animal (characteristic)
  "Print message in echo area depending on CHARACTERISTIC.  If the
CHARACTERISTIC is the symbol ‘fierce’, then warn of a tiger."
  (if (equal characteristic 'fierce)
      (message "It’s a tiger!")))
```

b7!"3l$r GNU Emacs NCfGFIsG$$$kJi!">e$N4X?tDj5A$rI>2A9k3H$G!" Emacs $K%$%s%9%H!<% k3H,=PMh$k!#$=$&$9kH!"<!NFsD$N#S<0$rI>2A7F7k2L$r8+$k3H$b=PMh$kh&KJ$k!#

```
(type-of-animal 'fierce)

(type-of-animal 'zebra)
```

(type-of-animal 'fierce) $rI>2A$9kH!"%(%3!<NN0hKO **"It’s a tiger"** $HI=<($5lkO:$@!#0lJ}!" **(type-of-animal 'zebra)** $rI>2A$9kH!" **nil** $,I=<($5lk!#

3.7.1 4X?t type-of-animal $N>\:Y

type-of-animal 4X?t$r>\$7$/8+$F$_$h$&!#

type-of-animal $N4X?tDj5A$OFsDN%F%s%W%l!<%H$N%9%m%C%H$rKdak3H$G=q$+lF$$$k!#0lDOA4BN$?tDj5A$N%F%s%W%l!<%H$G!"b&0lDO **if** <0$N%F%s%W%l!<%HG"$k!#

%$%s%?%i%/%F%#%V$G$J$$4X?t$N4X?tDj5A$N%F%s%W%l!<%H$O<!$NDLjG$"$k!#

```
(defun name-of-function (argument-list)
  "documentation..."
  body...)
```

3N%F%s%W%l!<%HKEvFOakH!"3FItJ,$O<!$Nh&KJ$k!#

```
(defun type-of-animal (characteristic)
  "Print message in echo area depending on CHARACTERISTIC.  If the
CHARACTERISTIC is the symbol ‘fierce’, then warn of a tiger."
  body: the if expression)
```

:#$N>l9g!"4X?t$NL>A0$O **type-of-animal** G"$k!#$3lO0z?t$r0l$D<h$k!#0z?t%j%9%H$N8e$K!"J#?t9T$ $k@bL@J8;zNs$,B3$/!#Nc$NCfKbAcsH@bL@J8;zNs$rF~$lkN$O!"A4$F$N4X?tDj5A$K@bL@J8;zNs$rF~$l$ $$=,47G"k+iG$"$k!#4X?tDj5A$NK\BNItJ,$O **if** <0$+$iJC$F$$$k!#

if <0$N%F%s%W%l!<%H$O<!NDLjG"$k!#

```
(if true-or-false-test
    action-to-carry-out-if-the-test-returns-true)
```

type-of-animal 4X?t$N>l9g!" **if** <0$N<B:]$N%3!<%I$O<!Nh$&$KJk!#

```
(if true-or-false-test
    action-to-carry-out-if-the-test-returns-true)
```

`type-of-animal` 4X?tGO!" **if** $K4X$9$k<B:]$N%3!<%I$O<!$Nh&KJCF$$$k!#

```
(if (equal characteristic 'fierce)
    (message "It's a tiger!")))
```

$3$3$G!"??56%F%9%H$NItJ,$O<!$N#S<0G"$k!#

```
(equal characteristic 'fierce)
```

Lisp GO!" **equal** $O:G=i$N0z?t$HFsHVL\$N0z?t$,Ey$7$$$+I&$+$rH=Dj9k4X?tG"$k!#FsHVL\$N0z?t$O0
D-$N%7%s%\%k **'fierce** G"$j!"01HVL\$N0z?t$O **characteristic** $H$$$&%7%s%\%k$NCM — D^$j!"3N4X
KEO5$1$k0z?tNCMG$"$k!#

@h$K9T$C$? **type-of-animal** $N:G=i$N<B9TGO!" **fierce** $, **type-of-animal** KEO7$?!# **fierce** $O **fierce** HEy7$$$N$G!"#S<0 **(equal characteristic 'fierce)** $O??$NCMrJV9!#3N>l9g$O!" **if** $OFs HVL\$N0z?t!"D^$j **if** <0$N then-part G"$k **(message "It's tiger!")** $rI>2A$9$k!#

01J}!" **type-of-animal** $NFsHVL\$N<B9TGO **zebra** $r0z?t$H7FEO7?!# **zebra** $O **fierce** GO$J$$$N $G!" then-part $OI>2A$5$1$:!" **if** <0$O **nil** rJV9!#

3.8 If–then–else <0

if <0$O!"%*%W%7%g%s$H7F *else-part* $H8F$P1k;0HVL\$N0z$-?t$r;}D3H,=PMh$k!#$3$1$O??56%F%9%H
rJV7$?>l9g$N$?$aNbNG$"$k!#3N>l9g$O **if** <0$NFsHVL\$N0z?tG"$k then-part $OI>2A$5$1$:!"Be$c
;0HVL\$N0z?tG"$k else-part $,I>2A$5$1$k!#3N3H$O!"F^$j$NF|$Js+$K!"!V$b$7!"@2$1FCH+$+$C$?$
%A$K9T$3$&!#$=$&$GJ+C?$i!"K\$GbFI`$+!*!W$H$$$&U&KBeojNA*Br;h$r9M$(kNKEvFOaF
F@=PMhk@m&!#

"else" $H$$$&C181$O Lisp $N%3!<%I$NCfKO=PF3$J$$!#C1$K!" else-part $O **if** <0$NCf$N then-part $N<!$K
$/$kMWAG$H$$$&$@$1G"$k!#<B:]$K Lisp $N%3!<%I$r=q$/>l9g!" else-part $O?7$7$/2~9T$7F+$i then-part
jO>/$J$$%%s%G%s%H$G=q$-;OakN,IaDLG"$k!#

```
(if true-or-false-test
    action-to-carry-out-if-the-test-returns-true)
  action-to-carry-out-if-the-test-returns-false)
```

Nc$($P!"<!$N **if** <0$O$$$DbDLj$KI>2A$9kH!" '**4 is not greater than 5!**' $H$$$&%a%C%;!<%8$rI=<($9$
bNG"$k!#

```
(if (> 4 5) ; if-part
    (message "5 is greater than 4!")  ; then-part
  (message "4 is not greater than 5!")) ; else-part
```

0[Jk%1%Y%k$N%%s%G%s%H$r9k3H$G!" then-part $H else-part $N6hJL$,7d9/Jk3H$KCm0U$7h
(GNU Emacs $O **if** <0$r<+F0E*$K@5$7$/%%s%G%s%H$9$k%3%^%s%I$r4vD+Hw$($F$$$k!# Section 1.1.3, "GNU
Emacs Kh$k%j%9%H$N%?%$%W$N;Y1g", p. 2, $r;2>H$N3H!#)

`type-of-animal` $N **if** <0$K?7$7$/ else-part $NItJ,$rDI2C9k$@$1$G!"$3$N4X?t$r3HD%9k3H$,=PMh$k!

<!$N%P!<%8%g%s$N **type-of-animal** $N4X?tDj5A$rI>2A7F%$%s%9%H!<%k$9$1$P!"$=$N8e$N!"0[$J$k0z?t$
9h$&$JFsDN#S<0$rI>2A$7$F!"7k2L$r8+k3Hb=PMhkh$&$KJk!#

```
(defun type-of-animal (characteristic) ; FsHVL\$N%P!<%8%g%s
  "Print message in echo area depending on CHARACTERISTIC.  If the
CHARACTERISTIC is the symbol ‘fierce’, then warn of a tiger; else say
it’s not fierce."
  (if (equal characteristic 'fierce)
      (message "It’s a tiger!")
    (message "It’s not fierce!")))

(type-of-animal 'fierce)

(type-of-animal 'zebra)
```

(type-of-animal 'fierce) $rI>2A$9kH!"%(%3!<NN0hKO **"It's a tiger"** $HI=<($5lkO:$@!#0lJ}!"
(type-of-animal 'zebra) $rI>2A$9kH!" **"It's not fierce!"** $HI=<($5lk!#

(L^O@!" *characteristic* $, **ferocious** G"C?Ji!" **"It's not fiece!"** $HI=<($5lk$@$m$&!#$=7F!"
3l$O4V0c$$$G$"$k!#%3!<%I$r=q$/>l9g$O!" **if** KhCF3Nh&$J0z?t$,%F%9%H5l$k2DG=@-$r9MN8$KF~
$=$l$K1~$8$F%W%m%0%i%`$r=q$+$J1lPJiJ$$!#

3.9 Lisp K*1k??$H56

if <0NCfN??56%F%9%HKD$$$F$O!"?($lF*$+$J1lPJiJ$$=EMW$JB&LL$,$"$k!#:#$^$G$O!"??$H$+
$$$&8@MU$r!"=R8l$NCMH7F"$?$+$b?7$7$$ Lisp $N%*%V%8%'%/%H$H7FOC7F$-$?!#7+$7<B:]$O!V56!W
NOC1$K2f!9$,?F7sG-$?NI$-M' **nil** JNG"$k!#$=7F!"$=$NB>$OA4$F — IsJbNG$"$CFb — !
G"$k!#

??G"k+H]$+%F%9%H$5lk#S<0$O!"I>2A$7$?7k2L$, **nil** 0J30NCMG$"$l$P *true* $HH=CG$5lk!#JL$N8(
r9kH!"%F%9%H$N7k2L$OJV5l$?CM$, 47 Nh$&$J?tCM$d!" **"hello"** $H$$$&h&$JJ8;zNs!"$"$k$$$O **flow**
$H$$$&h&$J (**nil** 0J30$N) %7%s%\%k$d!"%j%9%H$G$"$C$?$j!"O?$^$?%P%C%U%!G"C?j9$k>l9g$G$b??$
$H2r<a$5lko1G"$k!#

3N3H$r@bL@$9$kA0$K!" **nil** KD$$$F@bL@$;$MPJiJ$$$@m&!#

Lisp GO%7%s%\%k **nil** OFsD$N0UL#$r;}$D!#0l$DL\$O6u%j%9%HG"$k!#$=7FFs$DL\$O56G"$j!"??56%
$N7k2L$,4V0c$$$G$"$C$?>l9g$KJVkCMG$"$k!# **nil** $O6u%j%9%H$H7F **()** Nh$&$K=q$$$F$bNI$$$7!" **nil** $
Fb$h$$!# Lisp KHCF$O!" **()** $H **nil** $OA4$/F1$8$bNG$"$k!#7+$7!"?M4V$KHCFO **nil** $O56$rI=o
$K;H$$!" **()** $O6u%j%9%H$rI=o9NK;H$&$N$,IaDL$@m&!#

Lisp GO **nil** 0J30 — B($A6u%j%9%H0J30 — $NA4$FNCMO??$H2r<a$5lk!#3l$O!"I>2A$7$?;~$K6u%j%9%H
$N2?$+rJV9bN$O!" **if** <0$N%F%9%H$G??$HH=CG5lk3Hr0UL#9k!#Nc$($P!"b7%F%9%H$NItJ,$K?tCM
$?$H9k$H!" Lisp GO?tCM$OI>2A$5l?;~KO<+J,<+?HrJV9h&$K=PMh$F$$$kN@$+$i!"7k2LH7$F$3
$N **if** <0$G$N%F%9%H$O??HJ$k!#%F%9%H$N7k2L$,56$HJkNO#S<0$rI>2A$7$F **nil**!"B($A!"6u%j%9%H$,JV$k;
G"$k!#

<!$K5s$2kFsD$N#S<0$rI>2A7F$_$k3H$G!"$3N3Hr3N$+$ak3H,=PMh$k!#

:G=iNNcG$O!" **if** <0$N%F%9%H$N7k2L!"?t;z$N 4 $,I>2A$5$l!"$=$N?t<+?H$,JV5l$k!#7k2L$H7F then-
$,I>2A$5$l!"%(%3!<NN0h$K '**true**' $,I=<($5lk!#FsHVL\$NNcH7FO!" **nil** $O56$rI=o9NG 7k2LH7$F
part $,I>2A$5$l!"%(%3!<NN0h$K '**false**' $HI=<($5lk!#

```
(if 4
    'true
  'false)

(if nil
    'true
  'false)
```

$D$$$GJ,$i!"$b$7%F%9%H$G??rJV9h&JE,EvJCM$,8+$D$+$iJ1lP!" Lisp %$%s%?%W%j%?$O??$rI=$
aK%7%s%\%k t rJV9!#Nc$($P!" (> 5 4) $OI>2A$5l?>l9g t rJV9!#3l$b$$$DbNh&K7$F3NG'=PM

    (> 5 4)

0lJ}!"3N4X?t$O56$G$"$k>l9g$O nil rJV9!#

    (> 4 5)

3.10 save-excursion

4X?t **save-excursion** $O!"$3$N>O$G@bL@9k 4 HVL\$N!"$=$7$F:G8e$NFC<l7A<0G"$k!#

JT=8MQ$N Emacs Lisp %W%m%0%i%`$G$O!"4X?t **save-excursion** $OBgJQ$h$/;HMQ$5lkbNG"$k!#$3lO!
%]%$%s%H$H%^!<%/$N0LCV$r%;!<%V$7!"4X?t$NK\BN$r<B9T$7!"$=$7F=$N:]$K%]%$%s%H$H%^!<%/$N0LCV$,JQ$
$i!"$=lr85$N0LCV$KLa$9!#%]%$%s%H$H%^!<%/$,0U30$J>l=j$KF0$$$F!"6C$$$?$j!":$OG7?j9kNrKI
3N4X?t$N<g$JL\E*G"$k!#

7+7J$,$i!" **save-excursion** KD$$$F5DO@9kA0$K GNU Emacs K*$$$F!"%]%$%s%H$H%^!<%/$,$I$
$$$&bNG"k+$rI|=,$7F*$/$N$,NI$$$@m&!# *Point* $O8=:_$N%+!<%=%k$N0LCV$G$"$k!#%+!<%=%k$,2?=
m&$H!"$=l,%]%$%s%H$G$"$k!#hj@53N$K8@$&$H!"%+!<%=%k$,J8;z$N>e$K$"$kh&$JC<Kv$G$O!"%]%$%s%
$NJ8;z$N:8C<$N0LCV$K$"$k!# Emacs Lisp GO%]%$%s%H$O@0?tG"$k!#%P%C%U%!$N:G=i$NJ8;z$O 1 G"$j!"
L\$NJ8;z$O 2 G"$j… $H$$$C$?46$8$@!#4X?t **point** $O8=:_$N0LCV$r?t$H7FJV$9!#3F!9$N%P%C%U%!$,$=$
$N%]%$%s%H$N0LCV$r;}CF$$$k!#

(LuCp!'hj6qBNE*$K8@$&$H!"%+!<%=%k$,%P%C%U%!$N@hF,$NJ8;z$N>e$K$"$k>l9gKO!"%]%$%s%H$NCM$O 1 $K
HKJk!#$^$?!"FsJ8;zL\0J9_$O!"F|K\8lEy$N>l9g$O;v>p$,JQok!#Nc$($P Mule GO 2 %P%$%H%3!<%I$O 3
%H$GI=8=$5lkNG!"%]%$%s%H$N?t$O0lJ8;z$"$?$j 3 $:$D$:$l$k4*Dj$KJk!#)

mark $O!"%]%$%s%HHO$^$?JL$N!"%P%C%U%!$K$*$1k"$k0LCV$r;X$7<($9bNG"$k!#$=NCMO C-SPC (s
mark-command) $G@_Dj$5lk!#%^!<%/$,@_Dj$5lF$$$k>l9g!" C-x C-x (exchange-point-and-mark) $r
;HCF%+!<%=%k$r%^!<%/$K%8%c%s%W5;!"0JA0%]%$%s%H$,$"$C$?>l=j$K%^!<%/$r@_Dj$9k3H,=PMh$k!#9
$7B>$N%^!<%/$,4{$K$"$C$?>l9g!"0JA0$N%^!<%/$O%^!<%/%j%s%0$KJ]B8$5$l$k!#B?$/$N%^!<%/$r3&7FJ]B
H,=PMh$k!# C-u C-SPC $H%?%$%W9k3H$G!"0JA0J]B8$5l?%^!<%/$K=g$K5+$N\$C$F9T$/3H$,=PMh$k

%P%C%U%!NCfG!"%]%$%s%H$H%^!<%/$K64$^l?ItJ,$r %j!<%8%g%s (*region*) $H8F$V!#%j!<%8%g%s$K4X$9
%^%s%I$OBt;3$"$k!#Nc$($P!" **center-region**!" **count-lines-region**!" **kill-region**!"$=$7$F **print-region** Js$+$,$=$&G"$k!#

FC<l7A<0 **save-excursion** $O%]%$%s%H$H%^!<%/$N0LCV$rJ]B8$7!"3NFC<l7A<0Fb$NK\BNItJ,$N%3!<%I
Emacs Lisp KhCFI>2A5l$?8e$K!"$=$N0LCV$rI|85$9$k!# 3&7F!"Nc$($P%]%$%s%H$,$"$k%F%-%9%H
F,K"$j!"$"$k%3!<%I$,$=$N0LCV$r%P%C%U%!$N:G8e$K0\F0$7F7$^$C$?$H7F$b!"K\BNItJ,$N#S<0$,I>2A
oC$?8e$K **save-excursion** $,%]%$%s%H$r85$N0LCVKLa7F/lk!#

Emacs GO%f!<%6!<$,M=4|$7$J$$$=jG$b!"$7P7$PFbItE*$K%]%$%s%H$N0LCV$rF0$+7F$$$k3H$,$"$k!
$P **count-lines-region** Js$+$b%]%$%s%H$N0LCV$r0\F0$7$F$$$k!#M=4|7J$$!"$^$?(%f!<%6!<$NN)>l$+$
$F) ITI,MW$J0\F0KhCF%f!<%6!<$,HQ$o5lkNKI0?aK!" **save-excursion** $OIQHK$K;Hol$k!# **save-excursion** $r;H$&NO2HNCfr=;$_?4CO$NNI$$$bNK7F$*$/3H$H0l=o$G$"$k!#

2HNCf,$-$AsH@0M}5l$F$$$k$+$I$&$+$r3NG'$9k?aK!" **save-excursion** $O!"$?H(!"$=$NFbI
%3!<%I$,$&$^$/F0$+$J$$>l9gKb (@lLgMQ8l$r;H$CFh$j@53N$K8@$&$H!"!V0[>o=*N;7?>l9gKb!W)!"A
%$%s%H$H%^!<%/$N0LCV$rI|85$7$F$/$l$k!#$3$N5!G=$OBgJQLr$KN)$D!#

save-excursion $OC1$K%]%$%s%H$H%^!<%/NCMr5-O?9k$@$1GJ$/!"%+%s%H%P%C%U%!$bJ];}7F$$$F!"
$rI|85$7F/lk!#3l$O!"%P%C%U%!$rJQ99$9$kh&$J%3!<%I$r=q$$$F$b!" **save-excursion** $,85$N%P%C
KLa7F/lk3H$r0UL#$7$F$$$k!#<B:]!" **append-to-buffer** NCfG$O!" **save-excursion** O=$NL\E*$G
;Hol$F$$$k!# (Section 4.4, "**append-to-buffer** $NDj5A", p. 38, ;2>H!#)

3.10.1 save-excursion <0$N%F%s%W%l!<%H

save-excursion $N%F%s%W%l!<%H$O6KaFC1=cG"$k!#

```
(save-excursion
  body...)
```

4X?t$NK\BN$O0lDJ$$$7$OJ#?t$N#S<0G"$j!"$=li$,=g$K Lisp %$%s%?%W%j%?$KhC$FI>2A$5lF$$$/!#
BNKFsD0J>e$N#S<0$,$"$C$?$H9k$H!" **save-excursion** $H$$$&4X?t<+BNNCMH7F$O!"$=li$NFb:G8e$
<0NCM,JV5l$k!#B>$N#S<0$OC1$KI{:nMQH7$FI>2A$5lkNG$"$k!# **save-excursion** <+BN$O (%]%$%s%
%^!<%/$rI|85$9kH$$$&) I{:nMQ$@$1N?aKMQ$$$ilk!#

hj>\$7$/=q$/$H!" **save-excursion** <0$N%F%s%W%l!<%H$O<!Nh$&$K=q1k!#

```
(save-excursion
  first-expression-in-body
  second-expression-in-body
  third-expression-in-body
   ...
  last-expression-in-body)
```

$3$3$G#S<0$O!"%7%s%\%k$=$NbN$+!"$b7/$O%j%9%H$G$"$k!#

Emacs Lisp $N%3!<%I$G$O!" **save-excursion** <0$O!" **let** <0$NCfGh$/;H$olk!#<!Nh$&$J46$8$@!#

```
(let varlist
  (save-excursion
    body...))
```

3.11 I|=,

$3$3$^$G$N4v$D$+$N>O$G!"$+Jj$N?t$N4X?t$HFC<l7A<0$r>R2p7F$-$?!#$3$3G=li$r4JC1$K$^$HaF
F1;~$K!"$=3G$O?($lJ+C?N`;w$N4X?t$Js+$b>R2p$7F*$/$3HK9k!#

eval-last-sexp
: 8=:_$N%]%$%s%H$N0LCV$h$jA0J}$N:G8e$N#S<0$rI>2A9k!#DL>o$O#S<0$,JV$9CM$O%(%3!<NN0h$KI
lk$,!"0z?t$D$-$G8F$S=P$5l?;~$@$1$O%+%l%s%H%P%C%U%!$KI=<(9k!#IaDL$O!" **C-x C-e** $K%
%s%I5l$F$$$k!#

defun
: 4X?t$rDj5A$9$k!#$3$NFC<l7A<0$O:GBg 5 DNItJ,$+$iJk!#4X?t$NL>A0!"4X?t$KEO5l$k0z?t
%9%H!"@bL@J8;zNs!"%*%W%7%g%s$N%$%s%?%i%/%F%#%V@k8@!"$=$7$F4X?tDj5A$NK\BN$G$"$k!#
Nc)

```
(defun back-to-indentation ()
  "Point to first visible character on line."
  (interactive)
  (beginning-of-line 1)
  (skip-chars-forward " \t"))
```

interactive
: %$%s%?%W%j%?$KBP7F$=$N4X?t$,%$%s%?%i%/%F%#%V$K;HMQ=PMh$k3H$r@k8@$9$k!#$3$NFC<l7A<
$K4X?t$KEO$90z?t$K4X9k>pJsH7$FJ#?t$NItJ,$+$iJkJ8;zNs$,B3$/3H$,$"$k!#$3li$NI
CfKO%$%s%?%W%j%?$KBP7F$=$N>pJs$r5a$a$k%W%m%s%W%H$r=P9h$&MW5a$9kbNb$"$k!#3
NsNCfG$O3F!9$NItJ,$,2~9T%3!<%I '\n' KhCF6h@Zil$F$$$k!#

h/;Hol$k%3!<%IJ8;z$K$O!"<!$Nh&JbN,$"$k!#

b 8=:_B8:_9k%P%C%U%!!#

f 8=:_B8:_9k%U%!%$%k!#

p
?tCMG"$k A0CV0z?t!# (‘p’ $,>.J8;z$G$"$k3H$KCm0U!#)

r
FsDN?tCM0z?tH7FN%]%$%s%H$H%^!<%/$r!">.$5$$J}$r@h$KJBY?bN!#3N%3
%IJ8;zN_$,Fs$D$N0z?t$NNs$rFCDj$9$k!# (B>$O0lD@$1!#)

%3!<%IJ8;z$N40A4$J%j%9%HKD$$$F$O<!$r;2>H!# Section “Code Characters for ‘interactive’” in *The GNU Emacs Lisp Reference Manual*.

let
JQ?t%j%9%H$, let $NK\BNItJ,$N%3!<%IN_KBP7$F;H$olk3H$r@k8@$7!"$+$D!"$=$liNJQ
nil $J$$$7$O;XDj$7$?=i4|CM$rM?$($k!#$=$7$F!" let <0$NK\BNItJ,K"$k#S<0$rI>2A$7!"$=$NC
:G8e$N#S<0$rI>2A7?CMrJV9!# let <0$NK\BN$NFbItGO!" Lisp %$%s%?%W%j%?$O$=$N let <0$N
ItK"$kF1$8L>A0$NJQ?t$O8+$J$$!#

Nc)

```
(let ((foo (buffer-name))
      (bar (buffer-size)))
  (message
   "This buffer is %s and has %d characters."
   foo bar))
```

save-excursion
3NFC<l7A<0$NK\BNItJ,$rI>2A9kD>A0$N%]%$%s%H$H%^!<%/$N0LCV!"5Z$S%+%l%s%H%P%C%U%!$rJ
$k!#$=7FK\BN<B9T8e!"%]%$%s%H$H%^!<%/$N0LCV5Z$S%P%C%U%!$rI|85$9$k!#

Nc)

```
(message "We are %d characters into this buffer."
         (- (point)
            (save-excursion
              (goto-char (point-min)) (point))))
```

if
3N4X?t$N:G=i$N0z?t$rI>2A$9$k!#$=7F!"b7$=$NCM$,??$G$"$l$P!"FsHVL\$N0z?t$rI>2A$7!
GJ$$>l9g!";0HVL\$N0z?t$,$"lP$=$l$rI>2A$9$k!#

FC<l7A<0 if $O>r7oJ,4t (*conditional*) $H8F$Plk!# Emacs Lisp KOB>Kb>r7oJ,4t$,$"k,!"
if O=NCfG$bB?J,$bCHbh$/;H$olkbNG"m&!#

Nc!K

```
(if (string= (int-to-string 19)
             (substring (emacs-version) 10 12))
    (message "This is version 19 Emacs")
  (message "This is not version 19 Emacs"))
```

equal
eq
FsDN%*%V%8%'%/%H$,F1$8G"k+I&$+$r%F%9%H9k!# equal $NJ}$O!"b7N><T$,F1$89=B$$
?H$r;}$D>l9g$K??$rJV$9!#$b$&0lJ}$N eq $NJ}$O!"0z?t$,N>J}$H$b<B:]$KF1$8%*%V%8%'%/%H$G$"
N_??rJV9!#

<
>
<=
>=
4X?t < $O!":G=i$N0z?t$,FsHVL\$N0z?thj$b>.$5$$$+I&$+$r%F%9%H9k!#3lHBPrJ94X
$O!":G=i$N0z?t$,FsHVL\$hjbBg$-$$$+I&$+$r%F%9%H9k!#F1MM$K!" <= $O:G=i$N0z?t$,FsHV
0z?t0J2<G"k+I&$+$r!">= $O:G=i$N0z?t$,FsHVL\$h$j0J>e$G$"$k$+$I$&$+$r%F%9%H$9$k!#
>l9gGb0z?t$ON>J}$H$b?tCM$GJ1lP$$$1$J$$!#

message
%(%3!<NN0h$K%a%C%;!<%8$rI=<(9k!#3N%a%C%;!<%8$O0l9T$N$_$GJ1lPJi$J$$!#:G=i$N0
‘%s’, ‘%d’, $"$k$$$O ‘%c’ rCfK4^$`J8;zNs$G$"$j!"3liO$=$N8e$KB3$/0z?tK*$-$+$($ilk
‘%s’ $NItJ,$KF~$k0z?t$OJ8;zNs$+%7%s%\%k$GJ1lPJi$J$$!#$^$?!" ‘%d’ $NItJ,$KF~$k0z?t$
?tGJ1lPJiJ$$!# ‘%c’ $N=j$KF~$k0z?t$b?tGJ1lPJiJ$$$,!"3AiO$=$l$KBP1~
ascii %3!<%I$NJ8;z$,I=<(5l$k!#

setq
set 4X?t **setq** $O:G=i$N0z?t$KFsHVL\$N0z?tNCMr%;%C%H9k!#:G=i$N0z?t$O **setq** Kh$j!"<+F0E
0zMQId$,IU$1il$k!#B3$1$F0z?t$N%Z%"$r=q$$$$?>l9g!"$=$liK$D$$$F$bF1$8$3$Hr9$k!#$b$
$N4X?t **set** $NJ}$O!"FsDN0z?t7+<hk3H,=PMh$J$$!#$^$?!"$=$N0z?t$ON>J}$Hb^$::G=i
2A5l!"$=$N8e!"FsHVL\$N0z?t$rI>2A$7FJV5l?CM$r:G=i$N0z?t$rI>2A$7FJV5l?CM$K%;%
$k!#

buffer-name
0z?t$O;}$?$:!"%P%C%U%!L>A0$rJ8;zNsH7$FJV$9!#

buffer-file-name
0z?t$O;}$?$:!"%P%C%U%!$,%S%8%C%H7F$$$k%U%!%$%k$NL>A0rJV9!#

current-buffer
Emacs $,%"%/%F%#%V$G$"$kh&$J%P%C%U%!$NCf?HrJV9!#3l$O%9%/%j!<%s$K8+$($F$$$k%P%C
HO8BiJ$$!#

other-buffer
(**other-buffer** $K0z?t$H7FEO7?%P%C%U%!5Z$S!"%+%l%s%H%P%C%U%!$r=|$$$F) bCHb:G6a
Br7?%P%C%U%!$NCf?H$rJV$9!#

switch-to-buffer
Emacs KHCF%"%/%F%#%V$J%P%C%U%!$rA*Br$7!"%+%l%s%H%&%#%s%I%&$KI=<(7F%f!<%6!<$,8+
h&K9$k!#IaDL$O **C-x b** $K%P%$%s%I5l$F$$$k!#

set-buffer
3l$+$i%W%m%0%i%`rAvi$;$k%P%C%U%!$K Emacs $r@Z$jBX$($k!#$?$@$7!"I=<($7$F$$$k%&%#%
%&O=N^$^$G$"$k!#

buffer-size
%+%l%s%H%P%C%U%!$NJ8;z?t$rJV$9!#

point 8=:_$N%+!<%=%k0LCV$NCMr=$N%P%C%U%!$N:G=i$N0LCV$+iNJ8;z?tH7$FJV$9!#

point-min
%+%l%s%H%P%C%U%!NCfG5v5l$k:G>.$N%]%$%s%H$NCMrJV9!#%J%m!<%$%s%0$,M-8zGJ$$>l9
G"$k!#

point-max
%+%l%s%H%P%C%U%!NCfG5v5l$k:GBg$N%]%$%s%H$NCMrJV9!#%J%m!<%$%s%0$,M-8zGJ$$>l9g$
%U%!$N:G8e$N0LCV$K0lCW$9$k!#

3.12 N}=,LdBj

- 0z?tNCMrFsG\$9$k%$%s%?%i%/%F%#%VGJ$$4X?t$r=q$-J5$$!#$^$?!"$=$l$r%$%s%?%i%/%F%#%V$K
$$!#
- 8=:_$N **fill-column** NCM,4X?tKEO5lk0z?thjbBg-$$$+I&$+$H=Dj$7!"$b7=$&$JiE,EvJ
%;!<%8$rI=<($9kh$&$J4X?t$r=q$-J5$$!#

4 %P%C%U%!$K4X$9$k4v$D$+$N4X?t

3N>OGO!" GNU Emacs $G;H$olF$$$k4X?t$r!"4v$D$+>\$7$/8+$F$_$k3HK9$k!#$3$&$$$&3H
“walk-through” $H8F$Plk!#3liN4X?t$O Lisp %3!<%I$NNcH7$F07$&NG$"$k$,!":G=i$NC1=c2=5l$
$r=|$$$F!"7h7F!V4y>e!WNbNGOJ$$!#<B:]$K GNU Emacs $G;H$olF$$$k8=<B$N%3!<%I$G$"$k!#3I
4X?tDj5A$+$iB?$/$N3H$r3X$V3H$,=PMh$k!#3N>O$G@bL@$9$k4X?t$O!"3’%P%C%U%!$K4XO"$7$?$bNG$"$
bNKD$$$F$O8e$G3XV3HK7h$&!#

4.1 >pJs$NC5$7J}

3N walk-through NCfG$O!"?7$7$/=P$FMh$?4X?t$O$=$NETEY!";~KO:Y$+$/!";~KO4JC1$K!"@bL@$9$k
K9$k!#=P$FMh$?4X?t$K6=L#$r;}$C$?>l9g$O!" **C-h f** $KB3$1F=$N4X?tL>$r%?%$%W$7$F **RET** $r2!$;$P!"$I
Emacs Lisp 4X?tKD$$$F$b2?;~$G$b!"40A4$J@bL@J8$r8+$k3H$,=PMh$k!#F1MM$KJQ?t$K$D$$$F$b **C-h v** $KE
F=$NJQ?tL> ($H **RET**) $r2!$;$P!"$=$NJQ?t$N40A4$J@bL@J8$r8+k3H,=PMh$k!#

$^$?!"b7$=$N4X?t$N85$N%=!<%9$r8+$?$/$JC?$i!"4X?t **find-tags** $r;H$CF=$N4X?t$KHtV3H,=PMh
$^$: **M-.** $H%?%$%W$7 (B($A!" **META** %-!<$H%T%j%*%I%-!<$rF1;~$K2!$9$+!"$^$?$O **ESC** %-!<$r2!$7F+$i%T%
%I%-!<$r2!$7), =PF-$?%W%m%s%W%H$KBP7F%=!<%9%3!<%I$r8+$?$$4X?t$NL>A0!"Nc$($P **mark-whole-buff**
Ey!"$r%?%$%W9k!#9k$H!" Emacs $O%P%C%U%!$r@ZjBX($F!"$=$N4X?t$N%=!<%9%3!<%I$r%9%/%j!<%s$KI=
$/$l$k!#85$N%P%C%U%!KLakKO!" **C-x b RET** $H%?%$%W9l$PNI$$!#

$"$J$?$N;HCF$$$k Emacs $N%G%U%)%k%H$N=i4|CM$$$+sG$O ‘tags table’ $r;XDj$9kI,MW,$"$k$+$b7
$$!#3l$O ‘**TAGS**’ $H8F$Plk%U%!%$%k$G$"$k!# ‘**emacs/src**’ %G%#%l%/%H%jK"$k%U%!%$%k$r;XDj$9k3H
$k>l9g$,KXIG$"$m$&!#$=$N>l9g **M-x visit-tags-table** %3%^%s%I$r;H$C$F!"

‘**/usr/local/lib/emacs/19.23/src/TAGS**’

JINh$&$K%Q%9L>$r;XDj$9$k!# Section “Tag Tables” in *The GNU Emacs Manual*, ;2>H!#$^$?!"<+J,
<+?HNbNr:n@.9kJ}K!KD$$$F$O Section 12.5, “<+J,<+?H$N ‘**TAGS**’ %U%!%$%k$N:n@.”, p. 105, $r8+$h!#

Emacs Lisp $K47$lF7$^$CF+iO!"%=!<%9%3!<%I$rD/$ak?aKIQHK$K **find-tags** $r;H$&3HKJ$k
m&!#$=$7$F<+J,<+?H$N ‘**TAGS**’ %F!<%V%k$r:n$k3HKJkO$:$@!#

$D$$$GKIU12C$($F$*$/$H!" Lisp %3!<%I$r4^$`%U%!%$%k$OJX59>e%i%$%V%i%j (**library**) $H8F$Plk!
$N%a%?%U%!$O!"0lHLE*$J%i%$%V%i%jGOJ/!"Nc$($PK!N’H+9) 3XH+Nh$&$JFCDjJ,Ln$N%i%$%V%i%j
$F$$$k!#3F!9$N%i%$%V%i%j$J$$$7$O%U%!%$%kKOFCDj$N%H%T%C%/$dF0:n$K4X$9$k4X?t$,4^$^$l$F$$$k!#Nc
‘**abbrev.el**’ KO>JN,Ey$N%7%g!<%H%+%C%H%-!<$r07$&4X?t$,!"$^$? ‘**help.el**’ KO%*%s%i%$%s%X%k%W$r07$&4
$,<}$ail$F$$$k!"$H$$$C$?46$8G"$k!# (;~$K$OJ#?t$N%i%$%V%i%j$,0lDNF0:n$K4X$9$k%3!<%I$rDs6!$7
3Hb"$k!#EE;R%a!<%k$rFI$`$?aN%3!<%I$rDs6!$9$k ‘**rmail...**’ %U%!%$%kJs$+$,$=$&$@!#) **The GNU Ema**
Manual $r8+$l$P!"!V**C-h p** %3%^%s%I$KhC$FI8=`E*$J Emacs Lisp %i%$%V%i%j$r%H%T%C%/$r%-!<%o!<%I$K$7
8!:w9k3H$,=PMh$k!W$H8@$C$?5-=R$r8+D1k3H,=PMh$k!#

4.2 4JN,HG **beginning-of-buffer** $NDj5A

$^$: **beginning-of-buffer** $H$$$&4X?t$+$i;OakN,NI$$$G$"$m$&!#$3$N4X?t$K$O4{$K47lF$$$k$@
$&$7!"M}2r9kNb0W$7$$$+i@!#%$%s%?%i%/%F%#%V$J%3%^%s%IH7$F;H$olkbNG"m&$H!" **beginn**
of-buffer $O%+!<%=%k$r%P%C%U%!$N@hF,$K0\F0$5$;!"0JA0$N0LCV$K%^!<%/rCV/!#3N4X?t$OBgDq$O **M-<**
%$%s%I$5lF$$$k!#

3N>OGO!"3N4X?t$NC;=L$5l?%P!<%8%g%s$r@bL@$9k3HG!"3l$,$I$&$$$&U&$K;H$olk3H$,
$+$r<($=$&!#3NC;=LHG$b>e$K=q$$$?h&$JF0:n$r9k$,J#;($J%*%W%7%g%s$OIU$$$F$$$J$$!#40A4HGKD$
$N%;%/%7%g%s$G@bL@9k3HK9$k!# (Section 5.3, “**beginning-of-buffer** $N40A4$JDj5A”, p. 47, ;2>H!#)

%3!<%I$r8+$kA0$K!"$IsJ4X?tDj5A$,4^$^lF$$$k$+$r9M$($F$_$h$&!#$^$:!"4X?t$r%$%s%?%i%/%F%#%V$
aN!"B($A **M-x beginning-of-buffer** $H%?%$%W7?$j!"$"$k$$$O **M-<** $H$$$C$?%-!<%3!<%I$r%?%$%W$9k
HG8F$S=P$;kh$&$K9k$?$a$N#S<0$r4^sG$$$J1lPJiJ$$!#$^$?!"%P%C%U%!$N85$N0LCV$K%^!<%/$
$N%3!<%I$bI,MW$@!#99$K%+!<%=%k$r%P%C%U%!$N@hF,$K0\F0$9$k%3!<%I$bF~CF$$$J$/$FOJiJ$$!#

3l$,$3$N4X?t$NC;=LHG$N40A4$J%F%-%9%HG"$k!#

```
(defun simplified-beginning-of-buffer ()
  "Move point to the beginning of the buffer;
leave mark at previous position."
  (interactive)
  (push-mark)
  (goto-char (point-min)))
```

B>$N4X?tDj5A$HF1MM$K!"$3$NDj5A$bFC<l7A<0 **defun** $KB3$/8^DNItJ,$+$iJC$F$$$k!#

1. L>A0: 3N>l9g$O **simplified-beginning-of-buffer**!#
2. 0z?t%j%9%H: 3N>l9g$O6u%j%9%H **()**!#
3. @bL@J8;zNs!#
4. %$%s%?%i%/%F%#%V$K9k$?$a$N#S<0!#
5. K\BN!#

3N4X?tDj5AGO!"0z?t%j%9%H$O6u$G$"$k!#3l$O!"$3$N4X?t$,0z?trI,MWH7J$$$3Hr0UL#9k!# ($k
40A4HG$NJ}$NDj5A$r8+$l$P!"$=AiKO%*%W%7%g%s$N0z?t$rEO$9$3H,=PMhk3H,J,$k!#)

%$%s%?%i%/%F%#%V$K9k$?$a$N#S<0$O!" Emacs K3$N4X?t$,%$%s%?%i%/%F%#%V$K;Holk3HrEA$($k$
J*G"$k!#:#$N>l9g **interactive** $O0z?t$r;}$?$J$$!#$H$$$&Nb **simplified-beginning-of-buffer** $O
0z?trI,MWH7J$$$+iG$"$k!#

4X?t$NK\BNItJ,$O<!$NFs9T$+iJ$k!#

```
(push-mark)
(goto-char (point-min))
```

0l9TL\$O **(push-mark)** $H$$$&#S<0G"$k!#$3$N#S<0$, Lisp %$%s%?%W%j%?$KhC$FI>2A$5lk$H!"%+!<%
$,2?=h$K$"$m$&$H!"$=$N0LCV$K%^!<%/$,@_Dj5l$k!#%^!<%/$N0LCV$O%^!<%/%j%s%0$KJ]B8$5$l$k!#

Fs9TL\$O **(goto-char (point-min))** G"$k!#$3$N#S<0$O%+!<%=%k$r%P%C%U%!Fb$G$N:G>.%]%$%s%H!"B($
%P%C%U%!$N@hF,$K0\F0$9$k!# ($"$k$$$O!"b7%J%m!<%$%s%0$,$+$+CF$$$l$P!"%"%/%;%9=PMh$kHO0OFbGN
0LCV$K0\F0$9$k!# Chapter 6, “%J%m!<%$%s%0$H%o%$%I%K%s%0”, p. 53.)

push-mark %3%^%s%IKhCF!" **(goto-char (point-min))** $G%+!<%=%k$,%P%C%U%!$N@hF,$KHt$VA0$K!"$=
$N%+!<%=%k$N0LCV$K%^!<%/$,%;%C%H5l$k!#7k2L$H7F!"b785$N0LCV$KLam&$H;W$($P!" **C-x C-x** Kh$
$N0LCV$KLak3H,=PMh$k!#

3l$,$3$N4X?tDj5A$NA4FG$"$k!

b7!"3Nh&$J%3!<%I$rFIsG$$$F **goto-char** Nh$&$Kh/CNiJ$$4X?t$K=P$/o7$?$H9k!#$=$N>l
$O **describe-function** %3%^%s%I$r;H$CF3l,Is$J4X?t$+$r8+$k3H$,=PMh$k!#3N%3%^%s%I$r;H$&K
$^$: **C-h f** $H%?%$%W$7!"<!$KCNj?$$4X?t$NL>A0$r%?%$%W$7F+$i **RET**$r2!$;$PNI$$!# **describe-functio**
%3%^%s%I$O ‘***Help***’ %&%#%s%I%&K=$N4X?t$N@bL@J8;zNs$rI=<($7F/lk!#Nc$($P **goto-char** $N@bL@J8$
NDLjG"$k!#

```
One arg, a number.  Set point to that number.
Beginning of buffer is position (point-min),
end is (point-max).
```

(**describe-function** $O%W%m%s%W%H$r=P$9;~$K%G%U%)%k%HNCMH7F$=$N;~$N%+!<%=%k$ND>A0K"$k%7%s%
NCMr@_Dj9k!#=>CF!"%+!<%=%kr=$N4X?t$ND>8e$K;}$C$F$$$C$F **C-h f RET** $H%?%$%W9k3H$b=PMh$k

end-of-buffer 4X?tKD$$$F$b **beginning-of-buffer** H[$\F1$8G"$k!#$?$@$7!"4X?t$NK\BNItJ,$G!"
(goto-char (point-min)) $NItJ,$, **(goto-char (point-max))** HJCF$$$k!#

4.3 mark-whole-buffer $NDj5A

4X?t **mark-whole-buffer** $b!"4X?t **simplified-beginning-of-buffer** $HF1$8$/$i$$4JC1$KM}2r=PMh $k!#$?$@$7!":#2s$OC1=c2=$7$?$bNGOJ$/40A4$J4X?t$r8+$k3HK9$k!#

mark-whole-buffer 4X?t$O **beginning-of-buffer** 4X?t$[$IKOIQHKKO;Hol$J$$!#7+$7!"F1$8$/ $i$$M-MQG"$k!#$3$N4X?t$O%]%$%s%H$r%P%C%U%!$N@hF,$K!"%^!<%/$r%P%C%U%!$N:G8eKCV/3H$G!"%P%C% $r%j!<%8%g%s$H7F;XDj9k!#$^$?!"BgDq$O **C-x h** $K%P%$%s%I5l$F$$$k!#

3N4X?t$N40A4$J%3!<%I$O<!$NDLjG$"$k!#

```
(defun mark-whole-buffer ()
  "Put point at beginning and mark at end of buffer."
  (interactive)
  (push-mark (point))
  (push-mark (point-max))
  (goto-char (point-min)))
```

B>$NA4$F$N4X?t$HF1MM!" **mark-whole-buffer** $b4X?tDj5A$N%F%s%W%l!<%HK-AsHEvFO^CF$$$k!#$ %F%s%W%l!<%H$O<!$Nh&JbN@C?!#

(defun *name-of-function* (*argument-list*)
  "*documentation...*"
  (*interactive-expression...*)
  body...)

3N4X?t$NF0:n$G$"$k$,!"4X?tL>$O **mark-whole-buffer** G"$k!#0z?t%j%9%H$,6u%j%9%H ‘()’ KJCF$$ NG!"3N4X?t$O0z?t$rI,MWH7$J$$$3H,J,$k!#<!$K@bL@J8;zNs$,Mh$F$$$k!#

<!$N9T$O (interactive) G"$k!#$3lrD1kH Emacs O3$N4X?t$r%$%s%?%i%/%F%#%V$K;H$($kbN$H $J$9!#$3$3iJUN3H$OA0@a$N **simplified-beginning-of-buffer** 4X?t$N=j$G$b@bL@$7$?DL$jG"$k!#

4.3.1 mark-whole-buffer $NK\BN

4X?t **mark-whole-buffer** $NK\BN$O<!$N;09T$+iJ$k!#

```
(push-mark (point))
(push-mark (point-max))
(goto-char (point-min))
```

3N;09TN&$A:G=i$N9T$O#S<0 (push-mark (point)) G"$k!#

3N9T$O4X?t **simplified-beginning-of-buffer** $NK\BN$N:G=i$N9T$N (push-mark) $HA4$/F1$8F/$-$r 9k!#IAiN>l9gKb Lisp %$%s%?%W%j%?$O%+!<%=%k$N8=:_$N0LCV$K%^!<%/$r@_Dj9k!#

;dKO2?8N **mark-whole-buffer** 4X?tGO (push-mark (point))$H=q$+$l!" **beginning-of-buffer** 4X?tGO (push-mark) $H=q$+lF$$$k$+J,$i$J$$!#B?J,!"3N%3!<%I$r=q$$$??M$O (push-mark) $N0z?t$O N,2DG=$G!"0z?t$r<u$1<h$i$J$$>l9g!"%G%U%)%k%HGO<+F0E*$K8=:_$N%]%$%s%H$N0LCV$K%^!<%/$,@_Dj5l$ 3HrCNiJ+C?s@m&$H;W$&!#0?$$$O3N#S<0$,<!$N9T$HF1$8h&$J9=B$$KJkh&$K=q$$$?N+$ $$!#$$$:lK7Fb3$N9T$KhC$F Emacs $O%]%$%s%H$N0LCV$r7hDj$7!"$=$N0LCV$K%^!<%/$r@_Dj$9$k!#

mark-whole-buffer $N<!$N9T$O (push-mark (point-max)) G"$k!#$3$N#S<0$O!"%P%C%U%!NCfG%]%$ %s%H$N?t$,:GBg$N0LCV$K%^!<%/$r@_Dj$9$k!#$3lOBgDq$O%P%C%U%!$N:G8eG"$k!#($b$7!"%P%C%U%!$,%J%r %0$5$l$F$$$l$P!"%P%C%U%!$NCf$N%"%/%;%9$92DG=$JHO0O$G$N:G8eHx$KJk!#%J%m!<%$%s%0$K$D$$$F$N>\:Y$O ter 6, “%J%m!<%$%s%0$H%o%$%I%k%s%0”, p. 53, ;2>H!#)

%^!<%/$r@_Dj$5lk$H!"8=:_$N%]%$%s%H$N0LCV$K@_Dj$5lF$$$?0JA0$N%^!<%/$O2r=|5l$k!#$7$+$7!" $O:G6a@_Dj$5l?%^!<%/$N0LCV$HF1MM!"$=$N0LCV$r5-21$7$F$$$k!#$b7La$j$?$1lP!" **C-u C-SPC** $rFsEY% 9k3H$G!"$=$N0LCV$KLak3H,=PMh$k!#

5F!"$$$h$$$h:G8e$N9T$N **(goto-char (point-min))** G"$k!#$3lO **beginning-of-buffer** $HA4$/F1
8h$&$K=q$+$l$F$$$k!#3N#S<0$O%+!<%=%k$r%P%C%U%!NCfG%]%$%s%H$,:G>.$N0LCV$K0\F0$5$;$k!#$D$^$
%U%!$N@hF,($b7/$O%"%/%;%92DG=$JHO0OGN@hF,)$K0\F0$5$;$kNG$"$k!#$=$N7k2L!"%]%$%s%H$O%P%C%U
F,$K0\F0$7!"%P%C%U%!$N:G8eHx$K%^!<%/$,@_Dj$5lk!#3Nh&K7$F!"%P%C%U%!A4BN$,%j!<%8%g%sKJ$k

4.4 append-to-buffer $NDj5A

append-to-buffer %3%^%s%I$b **mark-whole-buffer** %3%^%s%I$HF1$8$/$i$$C1=c$J9=B$$r7F$$$k!#3N
%3%^%s%I$,$9k3HO%+%l%s%H%P%C%U%!$N%j!<%8%g%s($D$^$j!"%P%C%U%!Cf$N%]%$%s%H$H%^!<%/$"$kItJ,)
7?%P%C%U%!$KJ#<L$9k3HG$"$k!#

append-to-buffer %3%^%s%I$O!"%j!<%8%g%s$rJ#<L9kNK4X?t **insert-buffer-substring** $r;H
$&!#$3$N4X?t$OL>A0$+$i;!C;ilkDLj!"%P%C%U%!N"$kItJ,$+$iJ8;z$+iJ$kJ8;zNs!"B($A!VItJ,J8
$r<h$j=P7F!"$=$l$rB>$N%P%C%U%!$KA^F~$9$k!#4X?t **append-to-buffer** $NBgItJ,$O **insert-buffer-substring**$,$&$^$/F0:n9kh&$J>uBV$K@_Dj9k3H$K4X$9kbNG$"$k!#3N%3!<%I$O%F%-%9%H$,<L$
%P%C%U%!H=$N%3%T!<85$HJk%j!<%8%g%s$NN>J}$N;XDj$,I,MW$HJk!#3N4X?t$N40A4$J%3!<%I$O<!$NDI
$k!#

```
(defun append-to-buffer (buffer start end)
  "Append to specified buffer the text of the region.
It is inserted into that buffer before its point.

When calling from a program, give three arguments:
a buffer or the name of one, and two character numbers
specifying the portion of the current buffer to be copied."
  (interactive "BAppend to buffer: \nr")
  (let ((oldbuf (current-buffer)))
    (save-excursion
      (set-buffer (get-buffer-create buffer))
      (insert-buffer-substring oldbuf start end))))
```

3N4X?t$O0lO"$N%F%s%W%l!<%H$,Kd$ail$?$bNH8+Jo9HM}2r7d$9$$!#

:G$b30B&$N%F%s%W%l!<%H$O!"4X?tDj5A$NbNG"$k!#:#$N>l9g!"<!Nh$&$KJC$F$$$k(4vD+4{KKda
%9%m%C%Hb"$k)!#

```
(defun append-to-buffer (buffer start end)
  "documentation..."
  (interactive "BAppend to buffer: \nr")
  body...)
```

:G=i$N0l9T$O4X?t$NL>A0$H$=$N;0DN0z?t$r4^$s$G$$$k!#0z?t$O%F%-%9%H$,J#<L5l$k9T$-@h$N%P%C%U%
J#<L85$N%j!<%8%g%s$r;XDj9k **start** $H **end** G"$k!#

4X?t$N<!$NItJ,KO4J7i$G40A4$J@bL@$,5-$5lF$$$k!#

4.4.1 %$%s%?%i%/%F%#%V<0 append-to-buffer

append-to-buffer $H$$$&4X?t$O%$%s%?%i%/%F%#%V$K;H$olk4X?tJN$G!" **interactive** <0$,I,MWG"
$k!#(**interactive** KD$$$FI|=,9kKO!" Section 3.3, "4X?t$r%$%s%?%i%/%F%#%VK9$k", p. 21, $r8+$h!#)

```
(interactive "BAppend to buffer: \nr")
```

3N#S<0$OFs=E0zMQId$K0O$^$l$?0z?t$r;}$A!"$=$N0z?t$O '**\n**' KhCFJ,1il?FsDNItJ,$+$iJCF

0l$DL\$NItJ,$O '**BAppend to buffer:**' G"$k!#$3$3$G!" '**B**' $O Emacs $KBP$7!"3N4X?t$KEO$9%P%C%U%!L>
$r?R$Mkh$&$KMW5a7F$$$k!#3lKhCF Emacs $O%_%K%P%C%U%!$K '**B**' $KB3$/J8;zNs — :#$N>l9g$O '**Appe**

to buffer: '— $+$iJk%W%m%s%W%H$r=P$7$F!"%f-%6!<$KL>A0$rF~NO$9kh$&B%$9!# Emacs O3$N4X?t$N0z
%j%9%HK"$kJQ?t **buffer**$K!"$=$3$G;XDj$5l?%P%C%U%!$r%P%$%s%I9kNG$"$k!#

2~9T%3!<%I '**\n**' $O0z?t$N:G=i$NItJ,$HFs$DL\$NItJ,$rJ,$1k?aKMQ$$$ilk!# '**\n**' $N<!$K$O '**r**' $,B3
$$$k$,!"$3lO4X?t$N0z?t%j%9%H$NCf$N **buffer** $KB3$/FsDN%7%s%\%k (D^$j!" **start** $H **end**) $K%]%$%s%
%^!<%/NCMr%P%$%s%I$9k3Hr<(7F$$$k!#

4.4.2 append-to-buffer $NK\BN

4X?t **append-to-buffer** $NK\BNItJ,$O **let** $+$i;O$^$C$F$$$k!#

0JA08+$?$h$&$K (Section 3.6, "**let**", p. 24, $r;2>H) **let** <0$NL\E*$O!" **let** <0FbIt$@1G;Hol$kJQ?t$r0l
DJ$$$7$OJ#?t:n$j!"$=$l$K=i4|CM$rM?$($k3HG"$k!#$3lO!"$=$Nh&$JJQ?t$O **let** <030It$NF1$8L>
?t$H:.F1$5lk3H$,$J$$!"$H$$$&3H$r0UL#$7$F$$$k!#

let <0$NItJ,$r%"%&%H%i%$%s$K7F **append-to-buffer** $N%F%s%W%l!<%H$r=q$$$F$_$k!#3lKhCF **le**
<0$,$I$&$$$&U&$K4X?t$KAH$_9~$^lF$$$k$+$,J,$k!#

```
(defun append-to-buffer (buffer start end)
  "documentation..."
  (interactive "BAppend to buffer: \nr")
  (let ((variable value))
        body...)
```

let <0$O;0$D$NMWAG$r;}CF$$$k!#

1. %7%s%\%k **let**!#
2. JQ?t%j%9%H$NCf?H!#:#$N>l9gOFsD$NMWAG$+iJ$k%j%9%H (*variable value*) $,0l$D$"$k$@$1!#
3. **let** <0$NK\BN!#

4X?t **append-to-buffer** NCfG$OJQ?t%j%9%H$O<!Nh$&$KJC$F$$$k!#

```
(oldbuf (current-buffer))
```

let <0N3$NItJ,$G$O!"JQ?t **oldbuf** $, **(current-buffer)** $rI>2A$7FJV5l?CM$K%P%$%s%I5l$k!#JQ?
oldbuf $O8=:_:n6H$7$F$$$k%P%C%U%!$N5-O?$N$?$a$K;H$olkbNG"$k!#

JQ?t%j%9%H$NMWAG$O0lAH$N3g8L$K0O$^$l$F$$$k!#3lKhCF Lisp %$%s%?%W%j%?$OJQ?t%j%9%H$H **let** <
BN$r6hJL=PMh$kNG$"$k!#$=$N7k2LH7$FJQ?t%j%9%H$NCf$N!"Fs$D$NMWAG$+iJ$k%j%9%H$G$"$kh&$JMWA
0lAH$N3g8L$KhC$F0O$^lk3HKJ$k!#$H$$$&3H$G!"$3$N9T$O<!Nh$&$KJk!#

```
(let ((oldbuf (current-buffer)))
  ... )
```

RgCH9k$H **oldbuf** $NA0$KFsDN3g8L$,$"k3HK6C$/$+b7lJ$$$,!" **oldbuf** $NA0$N:G=i$N3g8L$O
%j%9%H$N6h@Z$j$r<($9bNG"$j!"<!$N3g8LOFsD$NMWAG$+iJ$k%j%9%H **(oldbuf (current-buffer))** $N
=i$N3g8L$G$"$k3H5(J,lPLdBj$J$$$@m&!#

4.4.3 append-to-buffer NCfN save-excursion

append-to-buffer NCfN **let** <0$NK\BN$O **save-excursion** <0$+$iJC$F$$$k!#

4X?t **save-excursion** $O%]%$%s%H$H%^!<%/$N0LCV$rJ]B8$7!" **save-excursion** $NK\BNItJ,$N#S<0$N<B9T
$,40N;$7$?;~E@$G$=$lir85$N0LCV$KLa$9!#99$K **save-excursion** $O85!9$N%P%C%U%!$,2?$G$"$C$?$+$b21
$$$F!"$=$N%P%C%U%!KLa7F/lk!# **save-excursion** $O **append-to-buffer** NCfG3Nh&$K;H$olF$
$k!#

$D$$$G$@$,!"$3$3$G Lisp $N4X?t$N=q<0H7FO!"DL>oJ#?t$N9T$K9-$,$C$F3g8L$GJD8ilF$$$kh&$J
A4$F!":G=i$N%7%s%\%khj$b?<$/%$%s%G%s%H$5lF$$$k3H$KCm0U$7F*$$$?J}$,NI$$$@m&!#:#2s$N4X?
CfGO<!Nh$&$K **let** <0$O **defun** hj$b?<$/%$%s%G%s%H$5lF$$$k!#

```
(defun ...
  ...
  ...
  (let...
    (save-excursion
      ...
```

3Nh&$K=q<0$r9)IW9k3H$G!" **save-excursion** $NK\BNItJ,$NFs9T$, **save-excursion** $KIU?o$9$k3g8I
$G0O$^lF$$$k3H$,4JC1$K8+FHlk!#F1MM$K!" **save-excursion** $=$l<+?H$, **let** $KIU?o$9$k3g8L$G0O$
$F$$$k3Hb9$0$KJ,$k!#

```
(let ((oldbuf (current-buffer)))
  (save-excursion
    (set-buffer (get-buffer-create buffer))
    (insert-buffer-substring oldbuf start end))))
```

4X?t **save-excursion** $N;H$$J}$O!"<!$N%F%s%W%l!<%H$N%9%m%C%H$,KdailF$$$kbN$@$H;W$&$Hh/M
=PMhk@m&!#

```
(save-excursion
  first-expression-in-body
  second-expression-in-body
   ...
  last-expression-in-body)
```

3N4X?tGO **save-excursion** KOFsDN#S<0$7$+4^$^$l$F$$$J$$!#$=$NK\BN$O<!$NDLjG$"$k!#

```
(set-buffer (get-buffer-create buffer))
(insert-buffer-substring oldbuf start end)
```

4X?t **append-to-buffer** $,I>2A$5lk$H!" **save-excursion** $NK\BNItJ,$NFsDN#S<0$,=g$KI>2A5l$k!#
:G8e$N#S<0$NCM$, **save-excursion**4X?t$NCMH7FJV5lk!#b&0lJ}$N#S<0$OC1$KI{:nMQ$@1N$?$a$KI>
lk!#

save-excursion $NK\BN$N:G=i$N9T$O!"8=:_$N%P%C%U%!$r **append-to-buffer** $N0z?t$N:G=i$N0z?t$G;XDj
5l$?$bNK@ZjBX(k?aK4X?t **set-buffer** $r;H$C$F$$$k!#(%P%C%U%!$N@ZBX$OI{:nMQG"$k!#A0$K$b
$?$h$&$K Lisp KHCF$NI{:nMQ$3$=$,2f!9$N<gL\E*$G$"$k3H$,B?$$!#) Fs9TL\$,3N4X?t$NK\Mh$N:n6
$&!#

4X?t **set-buffer** $O Emacs $NCm0U$r%F%-%9%H$r%3%T!<$7h&H7$F$$$k%P%C%U%!$NJ}$K8~$1$5$;$k!#$=
%P%C%U%!$+$i **save-excursion** KhCF85$N%P%C%U%!$K5"CF$/$kNG$"$k!#

```
(set-buffer (get-buffer-create buffer))
```

3N%j%9%HNbCH$bFbIt$K$"$k#S<0$O **(get-buffer-create buffer)** $H$$$&bNG"$k!#$3$N#S<0$
get-buffer-create 4X?t$r;H$C$F$$$k!#3lO=$NL>A0$N%P%C%U%!$NFbMF$r<h$j9~$`$+!"$b$7B8:_$7$J$$>
$O?7$7$/$=$NL>A0$r;}$D%P%C%U%!$r:n@.9k!#3l$O **append-to-buffer** 4X?t$r;H$&3H$G!"$=$l0JA0$K$
:_7FJ+C?%P%C%U%!Kb%F%-%9%H$r=PNO$9k3H,=PMhk3Hr<(7F$$$k!#

get-buffer-create O^$? **set-buffer** $,ITI,MW$J%(%i!<$KAx6x$9kN$rKI$$$G$b$$$k!#D^$j **set-buffer** $r;H$&;~$O9T$-@h$N%P%C%U%!$,B8:_7F$$$kI,MW$,$"kN$@!#$b7"jb7J$$%P%C%U%!$r;XDj$7$
kH Emacs O=3G;E;vrdaF7^$&!#B8:_$7$J$$%P%C%U%!G"$k>l9g$K$O **get-buffer-create** $,$=$
%P%C%U%!$r:n$CF/lkNG!" **set-buffer** $O>o$K%P%C%U%!$rF@$k3H$,=PMh$k$H$$$&o1G"$k!#

append-to-buffer $N:G8e$N9T$O%F%-%9%H$rDI2C9kF/$-$r9k!#

```
(insert-buffer-substring oldbuf start end)
```

4X?t **insert-buffer-substring** $O:G=i$N0z?t$G;XDj$5l?%P%C%U%!$+$iJ8;zNs$r%3%T!<$7!"$=$l$r8=:_
%P%C%U%!$KA^F~$9$k!#:#$N>l9g$O **insert-buffer-substring** $N0z?t$O **let** $G@8@.$5$l%P%$%s%I5l$?JQ?
oldbuf NCMG$"$j!"3l$O **append-to-buffer** %3%^%s%I$r<B9T$7$?;~E@$G$N%+%l%s%H%P%C%U%!$G$"$k!#

insert-buffer-substring $,:n6H$r=*$($k$H!" **save-excursion**$,85$N%P%C%U%!$KLa7F$/$l$k!#$=$&
7F **append-to-buffer** $N;E;v$O40N;9k!#

9|AH$_$@$1=q$/$H!"K\BNItJ,$,dC$F$$$k3H$O<!$NDLjG$"$k!#

```
(let (bind-oldbuf-to-value-of-current-buffer)
  (save-excursion                       ; %P%C%U%!$N>uBV$NJ]B8
    change-buffer
    insert-substring-from-oldbuf-into-buffer)

  change-back-to-original-buffer-when-finished
let-the-local-meaning-of-oldbuf-disappear-when-finished
```

0J>e$^$Hak$H!" **append-to-buffer** $O<!$Nh&$JF/$-r9$k!#$^$:$O%+%l%s%H%P%C%U%!NCMr **oldbuf**
$$$&JQ?t$KJ]B8$9$k!#<!$KJL$N%P%C%U%!$r%f!<%6!<$+$iJ9$-=P$7!"b7I,MWJi?75,$K:n@.$7$F!"$=$N%P%
0\$k!# **oldbuf** NCMrMxMQ7F85$N%P%C%U%!$N%j!<%8%g%sFb$N%F%-%9%H$r<h$j=P$7?7$7$$%P%C%U%!$KA^F~$9
7F:G8e$K **save-excursion** $rMQ$$$F855o$?%P%C%U%!$KLa$k!#

append-to-buffer $r8+$F$$$/Cf$G!"$+JjJ#;($J4X?t$rC58!7?3H$@$m$&!# **let** $d **save-excursion**
$N;H$$J}$b8+$il?$7!"J#?t$N%P%C%U%!4V$N9T$-Mh$N;EJ}$b8+$?!#B>$NB?$/$N4X?tDj5ANCfGb3Nh$
let, **save-excursion**, $=$7$F **set-buffer** $rMxMQ$7$F$$$k!#

4.5 I|=,

$3$3$G!"$3$N>O$G5DO@7?MM!9$J4X?t$K$D$$$F4JC1K^HaF*$/!#

describe-function
describe-variable
: 4X?t$J$$$7$OJQ?t$N@bL@J8;zNs$rI=<($9$k!#DL>o$O!" **C-h f** $H **C-h v** $K%P%$%s%I5l$F$$$k!#

find-tag
: 4X?t$N%=!<%9$dJQ?t$r4^$`%U%!%$%k$rC5$7$F!"$=$N%P%C%U%!$K0\$j!"$=$N4X?t$dJQ?t$,Dj5A5
$k0LCV$K%]%$%s%H$r0\F0$9$k!#DL>o$O **M-.** $K%P%$%s%I5l$F$$$k!# (3l$O!" **META** %-!<$r2!$
=*;_Id$r2!$9$H$$$&0UL#G"$k!#)

save-excursion
: %]%$%s%H$H%^!<%/$N0LCV$rJ]B8$7!" **save-excursion** $N0z?t$,I>2A5l$?8e$G!"$=$liNCM$r
KLa9!#$^$?!"%+%l%s%H%P%C%U%!$b21$($F$$$F!"$=$N%P%C%U%!KLa7F/lk!#

push-mark
: %^!<%/$r8=:_$N0LCV$K@_Dj$7!"D>A0$N%^!<%/$NCM$r!"%^!<%/%j%s%0$K5-O?9k!#3N%^!<%/$O!
%U%!Fb$N0LCV$r<($7!"$?H($=$N%P%C%U%!$K%F%-%9%H$,DI2C5l$?$j:o=|5l$?$j7F$b!"$=$
E*$J0LCV$rJ];}7F$/$l$k!#

goto-char
: %]%$%s%H$r0z?tNCMG;XDj5l$?0LCV$K0\F0$9$k!#0z?t$O?tCM$"$k$$$O%^!<%+!"b7$/$O **(poi
min)** Nh$&$K0LCV$rI=$o$9?tCM$rJV9h$&$J#S<0GJ1lPJiJ$$!#

insert-buffer-substring
: 3N4X?t$K0z?t$H7FEO5l$?%P%C%U%!$N%j!<%8%g%s$r8=:_$N%P%C%U%!$KA^F~$9$k!#

mark-whole-buffer
: %P%C%U%!A4BN$r%j!<%8%g%s$K@_Dj9k!#IaDL$O **C-x h** $K%P%$%s%I5l$F$$$k!#

set-buffer

Emacs $,CmL\$7$F$$$k%P%C%U%!$rB>$N%P%C%U%!$K@Z$jBX$($k!#$,!"%G%#%9%W%l%$$7$F$$$k%&%#%
%&$OJQ99$7$J$$!#?M4V$,B>$N%P%C%U%!$G:n6H$7$?$$;~hj$+$O%W%m%0%i%`NCfGh/;Holk
$"$k!#

get-buffer-create
get-buffer

$"$kL>A0$r;}$D%P%C%U%!$r8+$D1k!#$=$NL>A0$N%P%C%U%!$,L5$$>l9g$O?7$7$/:n$k!# **get-buff**
Ob7=$NL>A0$N%P%C%U%!$,L5$$>l9gKO **nil**rJV9!#

4.6 N}=,LdBj

- $"$J$?<+?H$N **simplified-end-of-buffer** $r=q$-J5$$!#$=$7$F!"$=l,<B:]$KF0$/3H$+$I$&$+%F%
%H7F$_$J$5$$!#
- **find-tag** $rMxMQ$7$F!" **copy-to-buffer** 4X?t$N%=!<%9$r8+D1J5$$!#

5 b>/$7J#;($J4X?t

3N>OGO!"A0$N>O$G3Xs@3H$r4pAC$KhjJ#;($J4X?t$r8+$F$$$/3HK9$k!# **copy-to-buffer** 4
$O!"0l$D$NDj5A$NCf$G **save-excursion** $rFs2s;H$&J}K!$r<($7F/lk!#0lJ}!" **insert-buffer** 4X?t$NJ
$O **interactive** <0$NCfGN * $N;H$$J}$H!" **or** $N;H$$J}!"$=$7$F!"%*%V%8%'%/%H$NL>A0$H!"$=$NL>A0$ND
%*%V%8%'%/%HHN0c$$$K$D$$$F65$($F$/$l$k!#

5.1 copy-to-buffer $NDj5A

append-to-buffer $,$INh$&$KF0:n9k$+$rM}2r7?8eG"lP!" **copy-to-buffer** $NJ}$b4JC1$KM}2r
=PMh$k!#$3$N4X?t$O%F%-%9%H$rB>$N%P%C%U%!$K%3%T!<$9$k!#$?$@$7!"$=$N%P%C%U%!KIU12C$($kNGOJ$
$"$C$?%F%-%9%H$rCV-49(F7$^$&!# **copy-to-buffer** 4X?t$N%3!<%I$O **append-to-buffer** $N%3!<%I$H$[
$\F1$8G"k,!" **erase-buffer**$r;H$$!"$^$? **append-to-buffer** $rFs2s;H$C$F$$$kE@$,0c$&!# (**append-to-buffer** $N@bL@$K$D$$$F$O Section 4.4, "**append-to-buffer** $NDj5A", p. 38, $r8+$h!#)

copy-to-buffer $NK\BN$O<!NDLjG"$k!#

```
...
(interactive "BCopy to buffer: \nr")
  (let ((oldbuf (current-buffer)))
    (save-excursion
      (set-buffer (get-buffer-create buffer))
      (erase-buffer)
      (save-excursion
        (insert-buffer-substring oldbuf start end)))))
```

3N%3!<%I$O **append-to-buffer** H=C/jG$"$k!# **append-to-buffer** $NDj5A$H$N0c$$$,8=lkNO!"
%F%-%9%H$,%3%T!<$5lk%P%C%U%!$K0\$CF+iG$"$k!#D^$j!"$3$N8e **copy-to-buffer** 4X?tGO0JA0$N
$r>C5n$7F7$^$&!# (3l$,!"!VCV$-49$(!W$H8@C?0UL#G"$k!# Emacs GO%F%-%9%HrCV-49$($k>l9g!
$NFbMF$r$^$:>C5n$7!"<!$K?7$7$$%F%-%9%H$rA^F~$9$k!#) 0JA0$NFbMF$r>C5n$7$?8e!"$b$&0lEY **save-excurs**
$,;H$olk!#$=$7$F?7$7$$%F%-%9%H$,A^F~$5lk!#

2?8N **save-excursion** $,Fs2s$b;Holk+!) $=$l$rM}2r$9k?aK!"b&0lEY3N4X?t$,2?$rdC$F$$$
8+F_h&!#

Bg6CQK$O!" **copy-to-buffer** $NK\BN$O<!Nh$&$KJC$F$$$k!#

```
(let (bind-oldbuf-to-value-of-current-buffer)
  (save-excursion         ; :G=i$N save-excursion!#
    change-buffer
      (erase-buffer)
      (save-excursion     ; FsHVL\$N save-excursion!#
        insert-substring-from-oldbuf-into-buffer)))
```

:G=i$N **save-excursion** $O Emacs $K%F%-%9%H$N%3%T!<85$N%P%C%U%!$rJV7F$$$k!#3lOEv?$jA0$N
HG!" **append-to-buffer** GbF1$8$h$&$J;HolJ}r7$F$$$?N@C?!#GO2?8NFsHVL\$,I,MWJN$+!)
M3$O!" **insert-buffer-substring** $,>o$K%]%$%s%H$rA^F~5l$?%j!<%8%g%s$N:G8e$K0\F0$7F7$^$&$+$i
$"$k!#FsHVL\$N **save-excursion**$,$"k*$+$2$G!" Emacs $OA^F~$5l?%F%-%9%H$N:G=i$N0LCV$K%]%$%s%H
0\F0$9$k!#BgDq$N>u67$G$O!"%f!<%6!<$OA^F~5l$?%F%-%9%H$N:G=i$N0LCV$K%]%$%s%H$,$"$k$[$&$r9%$`$
$k!# (L^O@!" **copy-to-buffer** 4X?t$O=*N;;~$K855o$?%P%C%U%!$KLa$k — 7+$7!"b7%f!<%6$,<!$K%3%T!<@
%P%C%U%!$K0\$C$?$H9k$H!"%]%$%s%HO=$N%F%-%9%H$N@hF,$K0\F0$7F/lkNG$"$k!#3Nh&$K!"Fs
save-excursion OAgCTj5$$N8z$$$?F/$-$r7F$/$lkbNJN@!#)

5.2 insert-buffer $NDj5A

insert-buffer b^$?!"%P%C%U%!$K4X9k4X?tG"$k!#$3$N%3%^%s%I$OB>$N%P%C%U%!$r%+%l%s%H%P%C%U%
Cf$KA^F~$9$k!#$3lO **append-to-buffer** $d **copy-to-buffer** $H5U$G$"$k!#3liNJ}$O!"%+%l%s%H%P%C
%U%!$+$i%j!<%8%g%s$r<h$j=P7FB>$N%P%C%U%!$K%3%T!<9kNG$"$C$?!#

99$K!"$3$N%3!<%I$O *read-only* $J%P%C%U%!$K4X9k **interactive**$N;H$$J}$d!"%*%V%8%'%/%H$NL>A0$H!"$=
L>A0ND$$$?%*%V%8%'%/%H$=$NbNHN0c$$$N=EMW@-$rM}2r$5$;$F$/$l$k!#$3l,$=$N%3!<%IG"$k!#

```
(defun insert-buffer (buffer)
  "Insert after point the contents of BUFFER.
Puts mark after the inserted text.
BUFFER may be a buffer or a buffer name."
  (interactive "*bInsert buffer: ")
  (or (bufferp buffer)
      (setq buffer (get-buffer buffer)))
  (let (start end newmark)
    (save-excursion
      (save-excursion
        (set-buffer buffer)
        (setq start (point-min) end (point-max)))
      (insert-buffer-substring buffer start end)
      (setq newmark (point)))
    (push-mark newmark)))
```

B>$N4X?tDj5A$HF1MM$K!"%F%s%W%l!<%H$r;HCF3N4X?t$N%"%&%H%i%$%s$r8+$k3H$,=PMh$k!#

```
(defun insert-buffer (buffer)
  "documentation..."
  (interactive "*bInsert buffer: ")
  body...)
```

5.2.1 insert-buffer NCfN%$%s%?%i%/%F%#%V<0

insert-buffer GO%$%s%?%i%/%F%#%V@k8@$N0z?tKOFsDNItJ,$,$"$k!#0l$D$O%"%9%?%j%9%/ '*****' G"$
b&0lDO '**bInsert buffer:** 'G"$k!#

=q$-9~$_IT2D$N%P%C%U%!

%"%9%?%j%9%/$O%P%C%U%!$, read-only— D^$jJQ99=PMh$J$$%P%C%U%!G"$k>l9g$N$?$aNbNG$"$k!#$b
insert-buffer $, read-only $J%P%C%U%!$G8FPl$?>l9g!"%(%3!<NN0h$K$=$N;]rCNi$;$k%a%C%;!<%8$,I=<(
$l!"%S!<%W2;$,LDk+!"2hLL$,L@LG$9$k!#!V$"J?O3$N%P%C%U%!$KG!2?JkbN$bA^F~$7FO$$$1$^$;$
$$$&o1G"$k!#%"%9%?%j%9%/$N8eKO!"<!$N0z?t$HJ,N%9k$?$a$K2~9T%3!<%I$rIU1kI,MWOJ$$!#

%$%s%?%i%/%F%#%V<0$NCf$N 'b'

%$%s%?%i%/%F%#%V<0$N<!$N0z?t$O>.J8;z$N 'b' $+$i;O$^$C$F$$$k!# (3l$O **append-to-buffer** $N%3!<%I
CfNH$O0c$&3H$KCm0U!#$3CAGOBgJ8;z$N 'B' $r;H$C$F$$$?N@C?!# Section 4.4, "**append-to-buffer**
$NDj5A", p. 38, ;2>H!#) >.J8;z$N 'b' $O Lisp %$%s%?%W%j%?$K **insert-buffer** $N0z?t$,B8:_9k%P%C%U%!
$J$$$7$O!"$=$NL>A0$GJ1lPJi$J$$$3Hr<(7F$$$k!# (BgJ8;z$N 'B' %*%W%7%g%s$NJ}$OB8:_$7$J$$%P
G"CF$bNI$$!#) Emacs $O%W%m%s%W%H$r=P7F%P%C%U%!$NL>A0$rMW5a$7!"F1;~$K%G%U%)%k%H$N%P%C%U%!$
7F$/$l$k!#L>A0$NJd40bdCF$/$l$k!#$b$7!"$3$3$GB8:_7J$$%P%C%U%!$r;XDj$9kH!" "No match" $
%a%C%;!<%8$r<u$1<h$k!#C<Kv$KhCFO%S!<%W2;$,$9k+b7lJ$$!#

5.2.2 4X?t insert-buffer $NK\BNItJ,

4X?t insert-buffer $NK\BN$O!"<gKFsD$NItJ,$+iJCF$$$k!#0lDO or <0G"$j!"$b$&0l$D$O let
G"$k!# or <0$r;H$&L\E*$O!"0z?t buffer $,%P%C%U%!$NL>A0GOJ/AcsH%P%C%U%!$=$NbN$K%P$$%s%
$F$$$k3H$r3NG'$9k3HG$"$k!# let <0$NK\BN$O!"B>$N%P%C%U%!$r%+%l%s%H%P%C%U%!$KA^F~$9$k%3!<%I
$G$$$k!#

Bg$^$+$K8@$C$F!"Fs$D$N#S<0$O<!Nh$&$K insert-buffer 4X?tNCfKAH9~$^$l$F$$$k!#

```
(defun insert-buffer (buffer)
  "documentation..."
  (interactive "*bInsert buffer: ")
  (or ...
      ...
  (let (varlist)
      body-of-let... )
```

0z?t buffer $,%P%C%U%!$NL>A0GOJ/%P%C%U%!$=$NbN$K%P$$%s%I5l$F$$$k$+$r or <0$,$INh$&$K
3N$+$a$F$$$k$+$rM}2r9kKO!":G=i$K4X?t or $rM}2r$9kI,MW,$"$k!#

$,!"$=$NA0$K$^$:3NItJ,$r if $r;H$C$F=q$-D>7F$_$?$$!#$=$&9lPh$j?H6a$JJ}K!$G2?$,J5lF
$r8+$k3H$,=PMh$k$@$m$&!#

5.2.3 or NBeojK if $r;H$C$? insert-buffer

dkY-;E;v$O buffer NCM,%P%C%U%!$=$NbNG"$j!"%P%C%U%!L>$GOJ$$$3Hr3NG'9k3HG"$
$7CM$,L>A0G"C?$i!"$=$NL>A0$N$D$$$?%P%C%U%!$r;}$CF3$J$$$H$$$1$J$$!#

$^$:$"$J$?$,2?$+$N%3%s%U%!%l%s%9$K;22C$7F*$j!"0FFb78$,$"$J$?J}$NL>A0$,=q$+l?%j%9%Hrb$C
$?$rC5$7$F$$$k>u67$r;W$$Ib$+$Y$FM_$7$$!#3N>uBVGO0FFb78O"J?<+?HGOJ/!"$"$J$?$NL>A0$K!
%I!W5l$F$$$k!#7+$7!"0FFb78$,$"$J$?$r8+D1F"J?NOSr<hC?;~E@$G!"0FFb78$O$"$J$?<+?H$K!
%I!W5l$?$3HKJk!#

Lisp GO3N>u67$r<!$Nh&$K@bL@=PMh$k!#

```
(if (not ($*5R$r$D$+$^$($F$$$k))
    ($*5R$r8+$D$1$FOS$r<h$k))
```

2f!9O3lHF1$8$3Hr%P%C%U%!KD$$$Fdj$?$$$o1G$"$k — %P%C%U%!$=$NbNGJ$$>l9g$b!"%P%C
8+D1$F<h$CFMh?$$$N$@!#

bufferp $H$$$& (%P%C%U%!$NL>A0$GOJ$/) %P%C%U%!$+I&$+$rH=Dj7F$/$l$k=R8l$r;H$&$H!"3N%3!<%
Nh$&$K=q$/$3H,=PMh$k!#

```
(if (not (bufferp buffer))              ; if-part
    (setq buffer (get-buffer buffer)))  ; then-part
```

%3%a%s%HKb$"$k$,!">e$N<0$G!" if <0$N??56%F%9%H$NItJ,$O(not (bufferp buffer)) G"$j!"0lJ} then-
part $NItJ,$O(setq buffer (get-buffer buffer)) G"$k!#

3N%F%9%HNCfG$O bufferp 4X?t$O0z?t$,%P%C%U%!$G$"$l$P??$NCMrJV9 — 7+$7%P%C%U%!$NL>A0G"
56NCMrJV$9!# (bufferp $H$$$&4X?t$NL>A0$N:G8e$O ‘p’ $G=*$oCF$$$k!#0JA08+$?$h$&$K3N ‘p’ $O!"$
4X?t$,=R8l!"$D$^$j!"$"$k@-<A$r;}$D$+H]$+$rH=Dj$9$k4X?t$G$"$k3H$r<($9$?$a$N9)IW$H7FIU1il
Section 1.8.4, “4X?t$K4V0c$C$?7?$N0z?t$rM?$(kH”, p. 9, $r;2>H$N3H!#)

(bufferp buffer) <0$NA0$K$O4X?t not $,$"$k!#B($A??56%F%9%H$O<!$NDLjG$"$k!#

```
(not (bufferp buffer))
```

not $O0z?t$,56G"lP??rJV7!"56G"lP??rJV94X?tG"$k!#=>$C$F!"$b$7 (bufferp buffer) $,??
JV$;$P!" not <0$,56$rJV$9$7!"56rJV;$P??$rJV$9!#!V??$G$J$$!W$H$$$&NO56$H$$$&3H$@$7!"!V56$G
$H$$$&NO??$@$H$$$&o1G"$k!#

if $O!"$3$N%F%9%H$r;HCF<!Nh$&$KF0:n9k!#JQ?t bufferNCM,%P%C%U%!$NL>A0$GOJ$/<B:]$K%P%C
$@$C$?>l9g!"??56%F%9%H$N7k2L$O56$G$"$k!#9k$H!" if <0$O then-part $rI>2A$7$J$$!#3lO^Hb$JF0
$"$k!#$H$$$&NO!"b7JQ?t buffer $,K\Ev$K%P%C%U%!G"lP!"3lKBP7FFCK2?b9kI,MWO$J$$$
$"$k!#

0lJ}$G!" buffer NCM,b7%P%C%U%!$=$NbNGOJ/%P%C%U%!$NL>A0$G$"$C$?$H9k$H!"??56%F%9%H
??$,JV$j!"7k2LH7$F then-part $,I>2A$5lk!#:#$N>l9g!" then-part $O (setq buffer (get-buffer
buffer)) G"$k!#$3$N#S<0$O!"$=$NL>A0ND$$$?<B:]$N%P%C%U%!$rF@k?aK get-buffer4X?t$r;H$C$F
$k!#$=7F!" setq $G!"JQ?t buffer NCMr%P%C%U%!$NL>A0$+$i<B:]$N%P%C%U%!$=$NbNKCV-49$($F$$$k!

5.2.4 K\BNItJ,$N or

insert-buffer 4X?t$G or <0$r;H$&L\E*$O0z?t buffer$,%P%C%U%!$NL>A0GOJ/%P%C%U%!$=$NbN$K%P%
%s%I5l$F$$$k$+$I$&$+$r3NG'$9k3HK$"$k!#A0@a$G!"$INh$&$K7F if $r;H$CF3$N:n6H$r9k$+$r
7+$7!" insert-buffer 4X?t$G$O<B:]$O or $r;H$C$F$$$k!#3NM}M3$rM}2r$9kK$O!" or 4X?t$NF/$-$rM
7J1lPJiJ$$!#

4X?t or $O$$$/iG$b0z?t$r;}D3H,=PMh$k!#$3$N4X?t$O3F0z?t$r=g$KI>2A7F$$$-!" nil GJ$+$C$
$N0z?t$NCMrJV9!#$^$?!"3l$, or $N=EMW$JFCD'JN$@$,!"3N4X?t$O0z?t$G nil 0J30NCMrJV9bN
$?>l9g!"$=$N8e$N0z?tObOdI>2A7J$$!#

:#$N>l9g$N or <0$O<!$NDLjG$"$k!#

```
(or (bufferp buffer)
    (setq buffer (get-buffer buffer)))
```

or $N:G=i$N0z?t$O #S<0 (bufferp buffer) G"$k!#$3$N<0$O!"b7 buffer $,%P%C%U%!$=NbNG$"$j%P%
%U%!$NL>A0$GOJ$$>l9g$O!"??$rJV$9!# or <0$G$O!"$3$N>l9g!" or <0$NCMH7$F??$rJV$7!"$=$N8e$N0z?t$
5l$J$$ — 2f!9KO3NJ}$,ET9g$,NI$$!#$H$$$&Nb3N>l9gKOD^$j buffer $,??$N%P%C%U%!G"$k>
$O!"$3NCMK$D$$$F2?b9kI,MW,$J$$$+iG$"$k!#

0lJ}$G!"$b$7 (bufferp buffer) $, nil G"lP!"$=lO buffer NCM,%P%C%U%!$NL>A0$G$"$k$H$$$&3
G"$k!#$3$N>l9g!" Lisp %$%s%?%W%j%?$O or <0$N<!$N0z?t$bI>2A9k!#3l$O (setq buffer (get-buffer
buffer)) $H$$$&<0G"$k!#$3$N<0$OCM nil rJV9!#3l$,JQ?t buffer $K%;%C%H$5l?CMG"$k — $=$7$F
NCMO%P%C%U%!$=$NbNG"$j!"%P%C%U%!$NL>A0GO$J$$!#

0J>eN3H+$i!"%7%s%\%k buffer $O>o$K!"$"$k%P%C%U%!$NL>A0$GOJ$/%P%C%U%!$=NbNK%P%$%s%I$
3HKJ$k!#$^$?!"0J>e$N<jB3$-$OA4F,I,MWJ3HG$"$k!#$H$$$&Nb!"<!$N9T$N set-buffer 4X?t$O
%U%!KBP7F7$+F/$+$J$$$+iG$"$k!#

$D$$$GJ,$i!" or $r;H$&$H0FFb78$H$$$&NO<!Nh$&$K=q1k!#

```
(or (holding-on-to-guest) (find-and-take-arm-of-guest))
```

5.2.5 insert-buffer NCfN let <0

insert-buffer 4X?tGO!"JQ?t buffer $,%P%C%U%!$NL>A0GOJ/%P%C%U%!$=$NbN$rI=$o$9$3Hr3NG'
$?8e$K$O!" let <0$,B3$/!#$3$3$G$O;0$D$NJQ?t start, end, newmark $r;XDj$7$F$$$k!#3liNJQ?t$O le
<0$NFbIt$GN_;Hol!" let <0$NI>2A$,=*ok$^$G$N4V$O!"0l<!E*$K Emacs Fb$NF1$8L>A0$NB>$NJQ?t$O1
$F$$$k!#

let <0$NK\BN$OFsDN save-excursion $r;H$C$F$$$k!#$^$:$O!"FbIt$K$"$kJ}$N save-excursion <0$r:Y
$+$/8+$F$$$3$&!#$3$N<0$O<!NDLjG"$k!#

```
(save-excursion
  (set-buffer buffer)
  (setq start (point-min) end (point-max)))
```

#S<0 **(set-buffer buffer)** $O!" Emacs $,CmL\$9$k%P%C%U%!$r%F%-%9%H$,%3%T!<85$N%P%C%U%!$K@Z$jBX$($k
3N%P%C%U%!NCfG!" **point-min** %3%^%s%I5Z$S!" **point-max** %3%^%s%I$r;H$C$FJQ?t **start** $H JQ?t **end** $K
3F!9%P%C%U%!$N;O$^jH=*oj$N0LCV$r@_Dj9k!# **setq**$r;H$C$F!"0l$D$N#S<0$GFsDNJQ?t$rF1;~$K@_Dj
K!KD$$$FOb$&4{$K@bL@7?N@C?!# **setq** $N:G=i$N0z?t$OFsHVL\$NCM$K!";0HVL\$N0z?t$O;MHVL\$N0z
$K%;%C%H$5lk!#

30B&$N **save-excursion** <0$O<!NDLjG"$k!#

```
(save-excursion
  (inner-save-excursion-expression
     (go-to-new-buffer-and-set-start-and-end)
  (insert-buffer-substring buffer start end)
  (setq newmark (point)))
```

4X?t **insert-buffer-substring** $O%F%-%9%H$r **buffer** NCfN **start** $H **end** $G;XDj$5l?%j!<%8%g%s$+
$i%+%l%s%H%P%C%U%!$NCf$K%F%-%9%H$r%3%T!<9k!#%3%T!<85$N%P%C%U%!A4BN$, **start** $H **end** $N4V$K$"$k$?$
$=$N%P%C%U%!A4BN$,8=:_JT=8Cf$N%P%C%U%!$K%3%T!<$5lk3HKJ$k!#<!$K!"3N;~E@$GA^F~$5l?%F%-%
8eK"$k%]%$%s%HNCM,!"JQ?t **newmark** $K5-O?$5lk!#

30B&$N **save-excursion** $NK\BN$,I>2A5l$?8e!"%]%$%s%H$H%^!<%/$N0LCV$O85$N0LCVKLa5lk!#

7+7J$,$i!"%]%$%s%H$H%^!<%/$N0LCV$O?7$7$/A^F~5l$?%F%-%9%H$N:G=i$H:G8e$K$"$kJ}$,!"2?$+
$,NI$$!# **newmark** JQ?t$OA^F~$5l?%F%-%9%H$N:G8e$N0LCV$r5-O?$9$k!# **let** <0$N:G8e$N9T$G **(push-mar
newmark)** $H$$$&#S<0$G%^!<%/$r3N0LCV$K@_Dj$7$F$$$k!# (0JA0$N%^!<%/$N0LCV0\F0$9$k3H$b2DG=$G$"$
NCMO%^!<%/%j%s%0$KJ]B8$5lF$$$F!" **C-u C-SPC** GALk3H$,=PMh$k!#) 0lJ}!"%]%$%s%H$NJ}$O=i$a$+$i
5l$?%F%-%9%H$N:G=i$N0LCV$K$"$k!#3l$O **insert** 4X?t$r8F$S=P$9A0$N%]%$%s%H$N0LCV$,$3$3$@$+iG$"

40A4$J **let** <0$O<!NDLjG"$k!#

```
(let (start end newmark)
  (save-excursion
    (save-excursion
      (set-buffer buffer)
      (setq start (point-min) end (point-max)))
    (insert-buffer-substring buffer start end)
    (setq newmark (point)))
  (push-mark newmark))
```

append-to-buffer 4X?t$N;~$HF1$8$h$&$K!" **insert-buffer** 4X?t$b **let**, **save-excursion**, $=$7$F
set-buffer $r;H$C$F$$$k!#$=$l$K2C$($F!"$3$N4X?t$O **or** N"$k;H$$J}$b0l$D65$($F$/$l$F$$$k!#3l$i
?t$O3'Bg@Z$JItIJG"$j!"$3l+$i2?EY$G$b=P$F$/$k3H$@$m$&!#

5.3 beginning-of-buffer $N40A4$JDj5A

beginning-of-buffer 4X?t$N4pK\E*$J9=B$$K$D$$$F$O!"4{$K5DO@7?3H$,$"kN$@$C$?!# (Section 4.2
"4JN,HG **beginning-of-buffer** $NDj5A", p. 35.) 3N%;%/%7%g%sGO3NDj5A$NJ#;($JItJ,$r@bL@$9k3H
9k!#

0JA0@bL@7?DL$j!"0z?tL5$7$G **beginning-of-buffer** $r8F$S=P9H!"$=$N;~E@GN%]%$%s%H$N0LCV$K%^
%/$r@_Dj$7$F!"%+!<%=%k$,%P%C%U%!$N@hF,$K0\F0$9$k!#7+7J$,$i!"b7$3$N%3%^%s%I$, 1 $+$i 10 $^$G
0l=o$K8F$S=P5l$?>l9g!"$3$N4X?t$O%P%C%U%!A4BN$r 10 H7F3$N?t$N3d9g$NJ,$r7W;;$7!"%P%C%U%!$N@h
$=$N3d9g$NJ,$@$1?J$s$@0LCV$K%+!<%=%k$r0\F0$5$;$k!#$H$$$&o1$G!" **M-<** G3$N%3%^%s%I$r8F$S=P$;$P
%=%k$O%P%C%U%!$N@hF,$K0\F0$9k7!"b7Nc$($P **C-u 7 M-<** H7$F8F$S=P$;$P!"%+!<%=%k$O%P%C%U%!A4BN$N
J,$N0LCV$K%]%$%s%H$r0\F0$9$k!#b70z?t$, 10 hjBg$-$+C?>l9g$O%P%C%U%!$N:G8e$K0LCV$K0\F0$9$k!#

beginning-of-buffer 4X?t$O!"0z?tL5$7$G8F$S=P$9$3H,=PMh$k!#$D$^$j!"0z?t$O>JN,2DG=$G$"$k!#

5.3.1 >JN,2DG=$J0z?t

FCK=$&$G$J$$$H8@ol$J$$8B$j!" Lisp $O!"4X?tDj5A$G0z?t$,;XDj$5l?4X?tO=$N0z?t$N$?$aNCMH$
8FPlkbNH;WCF$$$k!#b7!"$=$&GJ$+$C$?>l9g!"%(%i!<$,=P5l!" '**Wrong number of arguments**' $
$$$&%a%C%;!<%8$r<u$1<hk3HKJk!#

7+7J$,$i!" Lisp $NFCD'$H7F>JN,2DG=0z?t$H$$$&bN$,$"$k!#$"$k%-!<%o!<%I (*keyword*) $r;H$&$H L
%$%s%?%W%j%?$K$=$N0z?t$,>JN,2DG=$@HEA(k3H,=PMhkN$@!#$=$N%-!<%o!<%I$H$O **&optional** G"
('**optional**' $NA0$N '**&**' b3$N%-!<%o!<%I$N0lItJ,G"$k!#) 4X?tDj5A$NCfG3$N%-!<%o!<%I **&optional** $
8e$KB3$/0z?t$O!"4X?t$,8FPl$k:]$KI,$:$7bCMrEO5lkI,MWO$J$$!#

$H$$$&o1$G!" **beginning-of-buffer** $N4X?tDj5A$N:G=i$N9T$O<!Nh$&$KJk!#

```
(defun beginning-of-buffer (&optional arg)
```

$^$?!"4X?tDj5AA4BN$N%"%&%H%i%$%s$O<!$Nh&KJCF$$$k!#

```
(defun beginning-of-buffer (&optional arg)
  "documentation..."
  (interactive "P")
  (push-mark)
  (goto-char
    (if-there-is-an-argument
        figure-out-where-to-go
      else-go-to
      (point-min))))
```

3N4X?t$O **simplified-beginning-of-buffer** $H;w$F$$$k!#0c$&$N$O!" **interactive** <0$K **"P"** $,0z
?tH7$F;H$olF$$$k3H$H!"0z?t$,;XDj5l$F$$$k>l9g$K%+!<%=%k$r2?=h$K0\F0$9k+$rH=CG$9$k **goto-**
4X?t$KB3$$$F if-then-else <0$,Mh$F$$$k3HG"$k!#

interactive <0NCfN **"P"** $O!" Emacs $K!"4X?t$KA0CV0z?trEO9h&KEA(kbNG$"$k!#A0CV0z?t$H
$&$N$O **META** %-!<$KB3$$$F?t$r%?%$%W9k$+!" **C-u** $K2!$7F+$i?t$r%?%$%W$9k3HG:nk3H,=PMh$k!#
C-u $KB3$$$F?t$rF~NO$7$J$$>l9gKO!"%G%U%)%k%HH7$F 4 $,EO$5lk!#)

if <0$N??56%F%9%H$NItJ,$OC1=c$G$"$k!#C1$K **arg** $@$1$@!#$b$7!" **arg** $, **nil** 0J30$NCM$r;}$F$P!"B
beginning-of-buffer $,0z?tIU$-$G8F$Pl?>l9g$O!"??56%F%9%H$G$O??$,JV$j!" **if** <0$N then-part $,I>
2A5l$k!#0lJ}!"$b$7 **beginning-of-buffer** $,0z?t$HHb$K8F$PlJ$+$C$?$J$i!" **arg**$NCM$O **nil** KJ$j!
if <0$N else-part $NJ}$,I>2A5l$k!# else-part $OC1$K **point-min** G"$j!"$3$N>l9g$K$O **goto-char** <0$N
A4BN$O **(goto-char (point-min))** KJ$k!#$3lO!"0JA0$NC;=LHG **beginning-of-buffer** 4X?t$G8+$?DL
jG$"$k!#

5.3.2 0z?tIU$-$G8F$S=P$5l?>l9g$N beginning-of-buffer

beginning-of-buffer $,0z?tIU$-$G8F$S=P5l$?>l9g$O!" **goto-char** KEO9CM$r7W;;$9$k!"$"$k#S<0$,
I>2A5l$k!#$3$N#S<0$O!"AgCH8+KO$+$J$jJ#;($K8+$($k!#FbIt$K **if** <0$r4^sG$$$k$7!";;?t$rBt;3
$$$k!#<B:]$N%3!<%I$O<!NDLjG"$k!#

```
(if (> (buffer-size) 10000)
    ;; Bg$-$J%P%C%U%!%5%$%:$N>l9g$N%*!<%P!<%U%m!<$rHr$1$k!*
    (* (prefix-numeric-value arg) (/ (buffer-size) 10))
  (/
   (+ 10
      (*
       (buffer-size) (prefix-numeric-value arg))) 10))
```

B>$NJ#;($=$&$J#S<0$HF1MM!"$3lb%F%s%W%l!<%HKEvFOaF_lPM}2r7d9/Jk!#3N>l9g$O!" if
else <0$N%F%s%W%l!<%H$KEvFOak!#9|AH$_$O<!Nh$&$KJk!#

```
(if (buffer-is-large
      divide-buffer-size-by-10-and-multiply-by-arg
    else-use-alternate-calculation
```

3NCf$N **if** <0$N??56%F%9%H$O%P%C%U%!$N%5%$%:$r%A%'%C%/7F$$$k!#$=$NM}M3$O!" Emacs Lisp $N versi
18 $OLs 80,000 0J2<$N?tCM7+07oJ$$$N$@$, ($=$sJKBg$-$J?tOI,MWJ$$), 3N7W;;$K=>$&$H!"Bg$-$J
%U%!$N>l9g$O Emacs OBg-2a$.$k?t$r07$&3HKJCF7^$&$+i@!#%3!<%I$N%3%a%s%H$NCf$K=P$F$/$k '
flow' HO?t$,Bg$-2a$.$k3H$r0UL#$7$F$$$k!#

$H$$$&3H$G!"%P%C%U%!$,Bg$-$$>l9g$H!"$=$&$G$J$$>l9gNFsD$KJ,$1$F$$$k!#

Bg$-$J%P%C%U%!$N>l9g

beginning-of-buffer NCfGFbItK"$kJ}$N **if** <0$O%P%C%U%!$N%5%$%:$, 10,000 J8;z$r1[$($F$$$k$+$I$&
$+$r%F%9%H7F$$$k!#$=$N$?$a$K!"> $H **buffer-size** $H$$$&4X?t$r;H$C$F$$$k!#$=$N9T$O<!$NDLjG$"$k!

```
(if (> (buffer-size) 10000)
```

b7%P%C%U%!$,Bg$-$$>l9g$O!" **if** <0$N then-part $,I>2A$5lk!#3NItJ,rFI_d9$$$h$&=q$-D>9H<!
$&$KJk!#

```
(*
  (prefix-numeric-value arg)
  (/ (buffer-size) 10))
```

3N#S<0$O>hK!$G$"$j!"FsDN0z?t$r4X?t * KEO7$F$$$k!#

:G=i$N0z?t$O **(prefix-numeric-value arg)** G"$k!# **interactive** @k8@$G "P" $,;XDj$5lF$$$k>l
9g!"0z?t$O4X?t$K!VL$=hM}$NA0CV0z?t!W (raw prefix argument) H7FEO5$l!"?tCM$H7FOEO5lJ$$!#
%9%HNCfG$O?tCM$G$"$k!#) ;;?t$G;H$(kh$&$K9kKOJQ49$9$kI,MW$,$"$j!"$=$N;E;v$r **prefix-numer
value** $,$dCF$$$kNG$"$k!#

FsHVL\$N0z?t$O **(/ (buffer-size) 10)** G"$k!#$3$N<0$O?tCMH7FN%P%C%U%!NCMr 10 $G3d$k!#3l$
%P%C%U%!%5%$%:$N0l3dKIl@1NJ8;z?t$,4^$^lF$$$k$+$r7W;;9kbN$@!# (Lisp GO / $O=|K!$K;
$k!# * $,>hK!$K;HolkN$HF1MM$G$"$k!#)

>hK!$N<0A4BN$H7F$O!"$3NCMKA0CV0z?tNCMr3]1k3HKJ$k — 3s$J46$8$@!#

```
(* numeric-value-of-prefix-arg
   number-of-characters-in-one-tenth-of-the-buffer)
```

Nc$($P!"2>$KA0CV0z?t$, '7' $@$C$?$H9kJi!"3N 10 J,$N 1 $N?t$K 7 $r3]$1k3HG!"%P%C%U%!NCfN
$N0LCV$,F@ilk3HKJk!#

7k6I!"%P%C%U%!$,Bg$-$$>l9g$N **goto-char** <0A4BN$O<!Nh$&$KJk!#

```
(goto-char (* (prefix-numeric-value arg)
              (/ (buffer-size) 10)))
```

3l$G%+!<%=%k$OK>$`>l=j$K0\F0$7$F$/$l$k!#

>.5J%P%C%U%!$N>l9g

%P%C%U%!$, 10,000 J8;z$hjb>.5+C?>l9g$O!"$AgC$H0c$C$?7W;;$J}K!$,<h$ilk!#5C$-$NJ}K!G
kN$@$+$i!"$3sJ3Hr9kI,MWO$J$$$H;W$&$+b7lJ$$!#7+$7!"%P%C%U%!$,>.$5$$>l9g!"=iaNJ
%+!<%=%k$rK>$`>l=jK-As$H0\F0$7F/lJ$$!#<!$K@bL@$9$kFsHVL\$NJ}K!$NJ}$,AcsH7?;E;vr
$k!#

%3!<%I$O<!$NDLjG$"$k!#

```
(/ (+ 10 (* (buffer-size) (prefix-numeric-value arg))) 10))
```

3N%3!<%INCfG2?r7$F$$$k$+$O!"3g8LNCfKINh&$K4X?t$,Kd$a9~$^lF$$$k$+$r8+lPJ,$k!#3F!
$=$l$r4^$`3g8Lhj?<$/%$%s%G%s%H7Fdl$P!"$h$j8+$d9/Jk!#

```
(/
 (+ 10
    (*
     (buffer-size)
     (prefix-numeric-value arg)))
 10))
```

3liN3g8L$r8+$k$H!"$bCH$bFbIt$K$"$k4X?t$O (prefix-numeric-value arg) G"k3H,J,$k!#$3$
OL=hM}$NA0CV0z?t$r?tCM$KJQ49$9kbNG$"$k!#3N?tCM$O<!$N<0KhCF%P%C%U%!%5%$%:$H3]$19g$o$

```
(* (buffer-size) (prefix-numeric-value arg)
```

3N3]$1;;$G$O!"%P%C%U%!$N%5%$%:$NCMhjbBg-$J?t$,@8$:$k — Nc$($P0z?t$, 7 Ji 7 G\Bg$-$J?tKJ$
lK 10 $,2C$(il!":G8eK3NBg-$J?t$, 10 $G3d$ilk!#3&7FF@ilkCMO!"%P%C%U%!$N%5%$%:Cf$
H9$k3d9g$hjb0lJ8;zJ,$@$1Bg$-$J?tG"$k!#

3l$i0lO"$NA`:n$N7k2L$GF@il$??t$, goto-char KEO5$l!"%+!<%=%k$,$=$N0LCV$K0\F0$9$k!#

5.3.3 40A4HG beginning-of-buffer

$3$3$G!" beginning-of-buffer $N40A4$J%3!<%I$r5s$2F*$/!#

```
(defun beginning-of-buffer (&optional arg)
  "Move point to the beginning of the buffer;
leave mark at previous position.
With arg N, put point N/10 of the way
from the true beginning.
Don't use this in Lisp programs!
\(goto-char (point-min)) is faster
and does not set the mark."
  (interactive "P")
  (push-mark)
  (goto-char
   (if arg
       (if (> (buffer-size) 10000)
           ;; Bg$-$J%P%C%U%!%5%$%:$N>l9g$N%*!<%P!<%U%m!<$rHr$1$k!*
           (* (prefix-numeric-value arg)
              (/ (buffer-size) 10))
         (/ (+ 10 (* (buffer-size)
                     (prefix-numeric-value arg)))
            10))
     (point-min)))
  (if arg (forward-line 1)))
```

FsDN:Y$+$JE@$r=|$1$P!"$3l^GN5DO@G3$N4X?t$,I&F0$/$+$,J,$k$@$m$&!#:Y$+$JE@$N0l$DL\$O!"@
NsKD$$$FG"$j!"Fs$DL\$O!"3N4X?t$N:G8e$N9T$K4X$9kbNG$"$k!#

$G!"0lE@L\$@$,!"@bL@J8;zNs$NCf$K!"$"$k#S<0$K$D$$$F$N%j%U%!%l%s%9$,$"$k!#

```
\(goto-char (point-min))
```

3N<0$N:G=i$N3g8L$NA0$K '\' $,;H$olF$$$k!#3N '\' $O Lisp %$%s%?%W%j%?$KBP$7!"3N#S<0$O@bL@$H$
<(5lkbNG$"$C$F!"#S<0$H7FI>2A5lkbNGOJ$$$3Hr<(9bNG$"$k!#

<!$KFsE@L\$@$,!" **beginning-of-buffer** %3%^%s%I$N:G8e$N9T$O!"$3$N4X?t$,0z?tHHbK8FPl$?>l
$K!"%]%$%s%H$r<!$N9T$N:G=i$K;}CF$/$?aNbNG"$k!#

```
(if arg (forward-line 1)))
```

3lKhCF!"%+!<%=%k$O%P%C%U%!$NCfNE,EvJ3d9g$N0LCV$N<!$N9T$N@hF,$K0\F0$9$k!#$3l,:GNI$N0LC
$&!#%+!<%=%k$O>/$/$H$bMW5a$5l?3d9ghj$+$O>oKBg-$$0LCV$K0\F0$9k+i@!#3NF0:nOAgC$HQ
$.$k$+$b7l$J$$$,!"$+$H8@CF$=$&7J1l$P!"I,$:J86g$r8@$&?M$,$$$k$@$m$&!#

5.4 I|=,

$3$3$G!"$3$N>O$N4vD+$N%H%T%C%/$r<jC;K^HaF*$/!#

or 0z?t$r=g$KI>2A7F$$$-!" **nil** GJ$$:G=iNCMrJV$9!#$?$@$7!"b7I$N0z?t$b **nil** rJV7$
9g$O **nil** rJV9!#0l8@$G8@$&$H!"0z?tNCfG??G"$k:G=iNCMrJV$9!#D^$j!"$"$k0z?t$,??
k+$^$?$O (or) $=$NB>$N0z?t$NIl$+$,??G"lP??NCMrJV$9!#

and 0z?t$r=g$KI>2A7F$$$-!"Il$+0l$DGb **nil** $,$"lP!" **nil**rJV7!"Il$b **nil** $GL5$1lP
8e$N0z?t$NCMrJV9!#0l8@$G8@$&$H!"A4$F$N0z?t$,??G"$k>l9g$N$_??$G$"$kCMrJV9!#D^$
$k0z?t$,??G"$j!"$+$D (and) $=$NB>$N0z?t$bA4$F??$G$"$k>l9g$K??$N0z?trJV9!#

&optional
4X?tDj5AGN0z?t$,>JN,2DG=$G$"$k3H$r<($9$?$a$K;H$&%-!<%o!<%I!#3l$,$"kH!"$=$N0z?
$/$Hb=$N4X?t$rI>2A9k3H$,=PMh$k!#

forward-line
%]%$%s%H$r<!$N9T$N@hF,$K0\F0$9$k!# 1 hjBg$-$$0z?t$,M?$(il$?>l9g$O$=$N?t$N9T$@$1?J
?JaJ$$>l9g$O9T$1kH3m$^$G?J$_!"9T$/O:GO$"$C$?$,?JaJ$+$C$?J,$N9T?trCMH$
$9!#

erase-buffer
%+%l%s%H%P%C%U%!$NFbMF$rA4$F:o=|$9$k!#

bufferp 0z?t$,%P%C%U%!$N>l9g!" **t** rJV9!#$=$&GJ$$>l9g$O **nil** rJV9!#

5.5 &optional 0z?t$NN}=,LdBj

>JN,2DG=$J0z?t$r;}$A!"$=$N0z?t$N?t$, **fill-column** NCMhjbBg$-$$$+>.$5$$$+$r%F%9%H$7$F7k2L$r
F/lkh&$J%$%s%?%i%/%F%#%V$J4X?t$r=q$-$J$5$$!#$?$@$7!"0z?t$J7N>l9g$O 56 $r%G%U%)%k%H$H7F
$&$K7J$5$$!#

6 %J%m!<%$%s%0$H%o%$%I%K%s%0

%J%m!<%$%s%0$O%P%C%U%!$NFCDjItJ,$KN_CmL\$7!"$=$NB>$NItJ,$r4V0cCFJQ99$7$?j9k3HJ$/:n6
aN Emacs $N5!G=$G$"$k!#%J%m!<%$%s%0$OIaDL$O;H$($J$$$h$&$KJC$F$$$k!#3l$O=i?4<T$r:.Mp5;J
G"$k!#

%J%m!<%$%s%0$r;H$&$H!"%P%C%U%!N=$NB>$NItJ,O"$?$+$bB8:_$7$J$$$h$&$K8+$($J$/$J$k!#$3lO!"
%P%C%U%!N"$kItJ,$GN_C18lrCV-49$($?$$>l9gJs$+$KM-8zG"$k!#$D$^$jFCDj$NItJ,$K%J%m!<%$%s%
3GCV49$r<B9T$9kH!"$=$NItJ,N_CV49$,<B9T$5lF;DjNItJ,$OL5;k$5lk!#8!:wKD$$$F$bF1MM$G!
%$%s%0$5l?ItJ,GN$_8!:w$r9T$$!"30$NItJ,$OC5$5$J$$!#$H$$$&o1$G!"J8=q$N$"$kItJ,N_=$@5$7$?$
$I!"$=$N%j!<%8%g%s$K%J%m!<%$%s%0$r$+$1k3HG!"4V0cCF=$@5ITMW$J2U=j$^$G8+F7$^$&NrKI$0$3$
kNG"$k!#

7+7J$,$i!"%J%m!<%$%s%0$9kH%P%C%U%!$N;D$j$NItJ,$,8+$($J$/$JkN$G!"0U?^$;$:%J%m!<%$%s%0
$^$C$?>l9g!"%U%!%$%kN=$NItJ,$r:o=|7F7^C?NGOJ$$$+$HIT0B$K;W$&?M$b=PF/k+b7lJ
$K!" **undo** %3%^%s%I ($3lOBgDq **C-x u** $K%P%$%s%I5l$F$$$k) Gb%J%m!<%$%s%0$O2r=|5l$J$$ ($=$l$K
$&$9Y-GO$J$$)!#=>CF!"b7 **widen** %3%^%s%IG^$?8+$(kh$&$K=PMhkH$$$&3HrCNiJ+C?>
%Q%K%C%/$K4Y$$$k$+$b7l$J$$!# (Emacs version 18 GO!" **widen** $N%-!<%P%$%s%G%#%s%0$O **C-x w** $@$C$?!
version 19 GO **C-x n w** KJCF$$$k!#)

%J%m!<%$%s%0$O!"?M4V$@$1GOJ/ Lisp %$%s%?%W%j%?$KHCFbJXMxJh$&$KJC$F$$$k!# Emacs Lisp
4X?tO7P7$P!"%P%C%U%!$N$"$k8BDj5l$?ItJ,$KBP7FN_F/$/$h$&$K@_7W5l$F$$$k!#5U$K8@$&$H!"
Lisp 4X?t$O%J%m!<%$%s%0$5$l$?%P%C%U%!A4BN$KBP7FF/$/$h$&$KJC$F$$$kHb8@$($k!#Nc$($P **what-lin**
?t$O!"$b$7%P%C%U%!$K%J%m!<%$%s%0$,$+$+CF$$$lP=lr2r=|$7!";E;v$,=*okH^$?%J%m!<%$%s%0$r
$9!#0lJ}!" **what-line** 4X?tNCf+$i8F$S=P5l$k **count-lines** 4X?t$O!"$^$:%J%m!<%$%s%0$rMQ$$$F%P%C%U
$NL\E*$H9kItJ,$K8BDj$7$F;E;v$r9T$$!"$=$N8e%J%m!<%$%s%0$r2r=|7F85$N>uBV$KLa$9!#

6.1 FC<l7A<0 save-restriction

Emacs Lisp GO!" **save-restriction** $H$$$&FC<l7A<0$r;H$&3H$G!"%J%m!<%$%s%0N+$+$C$?>uBV$rJ
;}9k3H$,=PMh$kh&KJCF$$$k!# Lisp %$%s%?%W%j%?$, **save-restriction** <0$K=P0)$C$?>l9g!"$^
save-restriction <0$NK\BNItJ,$rI>2A$7!"<!$K$=$N%3!<%I$r<B9T$9k3HG%J%m!<%$%s%0$N>u67$,JQ$o$
>l9gK=lr85KLa9!#Nc$($P!"%P%C%U%!$,%J%m!<%$%s%0$5$l$F$$$F!" **save-restriction** $NK\BN$G!"%J%
%$%s%0$,2r=|5l$?>l9g!"<B9T8e$K **save-restriction** $O%P%C%U%!$K%J%m!<%$%s%0$5l?%j!<%8%g%srJV
$/$l$k!# **what-line** %3%^%s%IGO!"%P%C%U%!KIsJ%J%m!<%$%s%0$,@_Dj5l$F$$$F$b **save-restrictio**
$KB3$/ **widen** %3%^%s%I$G2r=|$7F7$^$&!#85$N%J%m!<%$%s%0O3$N4X?t$,=*N;9kD>A0$K85$KLa5lko$
$k!#

save-restriction <0$N%F%s%W%l!<%H$OC1=cG"$k!#

```
(save-restriction
  body... )
```

save-restriction $NK\BN$O0lDJ$$$7$OJ#?t$N#S<0G"$j!"$=li$O Lisp %$%s%?%W%j%?KhCF=g$KI>2A
lk!#

:G8e$KCm0U$7F*$/$3H,$"$k!#$=$l$O **save-excursion** $H **save-restriction** $NN>J}$r!"JRJ}$N$9
$08e$Kb&JRJ}$rB3$1$F;H$&>l9g!" **save-excursion** $NJ}$r30B&K9k3H@!#3l$r5U$K9k$H!" **sav**
excursion $r8F$S=P7F$+$i%J%m!<%$%s%0$,@_Dj5l$?%P%C%U%!$K0\F0$7$?>l9gK=$N%J%m!<%$%s%0$N>u6
O?7=3Mk3H,$"$kN@!#$H$$$&3H$G!"$b$7 **save-excusion** $H **save-restriction** $rN>J}0l=o$K;H
$&$J$i!"<!$Nh&$K;H$&3HKJ$k!#

```
(save-excursion
  (save-restriction
    body...))
```

6.2 what-line

what-line %3%^%s%I$O8=:_%+!<%=%k$,$"$k>l=j$^$G$N9T?t$r65$($F$/$lkbNG$"$k!#3N4X?t$r8+$k
$G!" save-restriction $H save-excursion $N;H$$J}rCNk3H$,=PMh$k!#0J2<$,$3$N4X?t$N40A4$J%3!<%I
G"$k!#

```
(defun what-line ()
  "Print the current line number (in the buffer) of point."
  (interactive)
  (save-restriction
    (widen)
    (save-excursion
      (beginning-of-line)
      (message "Line %d"
               (1+ (count-lines 1 (point)))))))
```

3N4X?t$O0l9T$N@bL@J8;zNs$r;}$A!"$"$J$?$,M=A[7?DL$j!"%$%s%?%i%/%F%#%V$J4X?t$G$"$k!#<!NFsD
$O save-restriction $H widen $r;H$C$F$$$k!#

FC<l7A<0 save-restriction $O!"%+%l%s%H%P%C%U%!$KINh&$J%J%m!<%$%s%0$,$+$+$C$F$$$h$&$H!"$=$
5-O?7FK\BN$N%3!<%I$,I>2A$7=*$oC?8eK=$N>uBV$KLa7F$/$l$k!#

FC<l7A<0 save-restriction $N8e$K$O widen $,B3$$$F$$$k!#3N4X?t$O!" what-line $,8F$Pl?;~$K%+
%l%s%H%P%C%U%!$N%J%m!<%$%s%0$r2r=|$9$k!# ($3$3$G$N%J%m!<%$%s%0$O!" save-restriction $,21$($F$$$
%m!<%$%s%0$G$"$k!#) 3lKhCF9T?t$r?t$($k%3%^%s%I$O!"%P%C%U%!$N:G=i$+iN9T?t$r?t$(k3H,=
G"$k!#$=$&$7$J$$>l9g$O!"8=:_%"%/%;%92DG=$J%j!<%8%g%s$NHO0OFb$G7+9T?t$r%+%&%s%H$7$J$$!#85$N%
%s%0$OFC<l7A<0 save-restriction KhCF3N4X?t$,=*N;$9$kD>A0$K85$N>uBV$KLa5l$k!#

widen $N8F$S=P7KB3$$$F save-excursion $,;H$olF$$$k!#3l$O%+!<%=%k$N0LCV!" (B($A!" point $N0
CV) $H%^!<%/$N0LCV$rJ]B8$7!"K\BNItJ,$N%3!<%I$NCf$N beginning-of-line 4X?t$KhC$FF0$+5l$?%]%$%
$N0LCV$r85KLa9!"$H$$$&F/$-$r7F$$$k!#

((widen) <0$, save-restriction $H save-excursion $N4V$K$"$k3H$KCm0U$7h&!#3liFsD$N
save- ... <0$rB3$1$F;H$&>l9g$O save-excursion $r30B&$K=q$+$J$$$H$$$1$J$$$NG"C?!#)

what-line 4X?t$N:G8e$NFsDN9T$O!"%P%C%U%!Fb$N9T?t$r?t$(!"$=$l$r%(%3!<NN0h$KI=<(9kbNG"$k

```
(message "Line %d"
         (1+ (count-lines 1 (point)))))))
```

message 4X?t$O Emacs $N2hLL$N:G2<9T$K0l9T%a%C%;!<%8$rI=<(9k4X?tG"$k!#:G=i$N0z?t$OFs=E0zM
$K64$^lF$$$F!"3l$OJ8;zJ8;zNs$rI=<(9kbNG"$k!#$?$@$7!" '%d', '%s', '%c' $bF~$lk3H,=PMh$F
liO3$NJ8;zNs$N8e$KB3$/0z?t$rI=<($9$k!# '%d' $O0z?t$r 10 ?J?tH7$FI=<($9kN$G!"%a%C%;!<%8$ON
'Line 243' $H8@$C$?46$8KJ$k!#

'%d' $N>l=j$KI=<(5l$k?t;z$O!"3N4X?t$N:G8e$N9T$G7W;;$5lk!#

```
(1+ (count-lines 1 (point)))
```

3l$,$dCF$$$k3H$O 1 $G<($5l?0LCV!"D^$j%P%C%U%!$N:G=i$N0LCV$+$i (point) $^$G$N9T$r?t$(!
$K 1 $r2C$(k3HG$"$k!# (1+$H$$$&4X?t$O0z?t$K 1 $r2C$($k4X?t$G$"$k!#)1 $r2C$(kN$O!"Nc$($PFs9TL
$NA0$K0l9T7+$J$$$+iG$"$k!# count-lines $O%+%l%s%H9T$NA0$N9T$^G7$+?t$($J$$$N$G!"$3$&$7$J$$
9T$:$lF7$^$&N@!#

count-lines $,;E;v$r=*$($F%a%C%;!<%8$,%(%3!<NN0h$KI=<(5l$?8e$O save-excrusion KhCF%]%$%
%H$H%^!<%/$N0LCV$,85$N>uBVKLa5lk!#$=$7$F!" save-restriction $,%J%m!<%$%s%0$N>uBV$r85KLa9!#

6.3 %J%m!<%$%s%0$NN}=,LdBj

%+%l%s%H%P%C%U%!$N:G=i$N 60 J8;z$rI=<($9kh$&$J4X?t$r=q$-J5$$!#$=$N:]!"Nc$($P%J%m!<%$%s%0$ 8eH>ItJ,7+%"%/%;%9ITG=G"$j!":G=i$N9T$,8+$($J$$>uBVG"CFb-As$HI=<($9kh$&$JbN$K $$!#$^$?!"%]%$%s%H!"%^!<%/!"5Z$S%J%m!<%$%s%0$rI|85$9$kh&K9k3$H!#$3$NN}=,LdBj$N$?$aKO!" **restriction**!" **widen**!" **goto-char**!" **point-min**!" **buffer-substring**!" **message** 5Z$SB>$N4X?tr&$^ $/AH$_9go;$F;H$&I,MW$,$"$k!#

7 car, cdr, cons: 4pK\4X?t

Lisp GO **car**!" **cdr**!"$=$7$F **cons** $,4pK\E*$J4X?tG"$k!# **cons** 4X?t$O%j%9%H$r:n$kNK;Hol!" **car** 4
?t$H **cdr** 4X?t$O$=$lirJ,2r9kNK;Hol$k!#

copy-region-as-kill 4X?t$r “walk-through” 9k;~$K!" **cons**$H6&$K **cdr** NFsD$NJQ<o$G$"$k **setcdr**
$H **nthcdr** KD$$$F$b8+$kDbj@!# (Section 8.5, “copy-region-as-kill”, p. 71).

cons 4X?t$NL>A0$OFC$KHs9gM}E*$JbNGO$J$$!#3NL>A0$O ‘construct’ $H$$$&C18l$rN,$7$?$bNG$"$k
J}!" **car** $H **cdr**$NL>A0$NM3Mh$OFq2rG"$k!# **car** $O ‘Contents of the Address part of the Register’ $H
$$$&%U%l!<%:$NF,J8;z$+iMhF$*$j!" **cdr** (‘could-er’ $HH/2;$9$k) $O ‘Contents of the Decrement part of
the Register’ $H$$$&%U%l!<%:$+$iMh$F$$$k!#3liN%U%l!<%:$O!" Lisp $,3+H/$5l?:"$N6K$a$F=i4|$N%O
%&%'%"$NFCDj$NItJ,$K4p$E$/$bNG$"$k$,!"C1$K;~BeCYlG$"$k$H$$$&$@$1GJ$/!"<B$K 25 G/0J>ebN4V
$K4X$o$k?M!9$KHC$FA4$/8+EvO:lNbNG"C?!#$@$,7+$7!"$3li$N4X?t$rbC$H9gM}E*$JL>A0$
H7$?3X<T$b2??M$+$$$?Kb4Xoi$:!"8=:_$Gb3$N8E$$MQ8l$,;H$olF$$$k!#FC$K Emacs Lisp $N%=!<%
%IGb3NMQ8l$,;H$olF$$$kNG!"3NF~Lg=qGb3lir;H$&$3HK7h$&!#

7.1 car $H cdr

%j%9%H$N **car** HO!"C1K=$N%j%9%H$N:G=i$NMWAG$N3HG"$k!#=>CF!"%j%9%H **(rose violet dais**
buttercup) $N **car** $O **rose**$G$"$k!#

b7!"3NJ8>O$r GNU Emacs $N Info GFIs$G$$$kJi!"<!$rI>2A$7F_k3HG3N3H$r3NG'=PMh$

```
(car '(rose violet daisy buttercup))
```

3N#S<0$rI>2A$9kH!"%(%3!<NN0h$K **rose** $HI=<($5l?O:$@!#

L@i+$K **car** KO **first** $H$$$&L>A0$NJ}$,U5o7$$$7!"h/$=$&Ds0F5lFb$$$k!#

car $O:G=i$NMWAG$r=|$$$?jO7J$$!#$?$@C1K=l,2?$+$rEA$($k$@$1G"$k!#$"$k%j%9%H$K **car** $r;
8e$b!"$=$N%j%9%H$O85N^$^$G$"$k!#@lLgMQ8lGO!" **car** $O!VHsGK2uE* (non-destructive)!WG"kH8@C
9k!#3NFCD'$O!"8e$G=EMWG"k3H,J,k@m&!#

List $N **cdr** $O%j%9%H$N;DjNItJ,G"$k!#$D$^$j!" **cdr** 4X?t$O%j%9%H$N:G=i$NMWAG$r=|$$$?ItJ,rJV9!#
$F!"'**(rose vilolet daisy buttercup)** $H$$$&%j%9%H$N **car** $, **rose** G"kh$&$K!"3N%j%9%H$N;DjN
ItJ,!"D^$j **cdr** $r;\$7FJV5lkCM$O **(violet daisy buttercup)** G"$k!#

3N3H$b!"<!$r$$$DbDLjI>2A7F$_$k3H$G3N$+ailk!#

```
(cdr '(rose violet daisy buttercup))
```

3l$rI>2A$9kH!"%(%3!<NN0h$K **(violet daisy buttercup)** $HI=<($5l?O:$@!#

car $HF1MM!" **cdr** $b%j%9%H$+$iMWAG$r<h$j=|$$$?j7$J$$ — $?$@C1$KFsHVL\0J9_$NMWAG$N%j%9%H$rJV$9
G"$k!#

$D$$$G$K8@$CF*$/$H!">eNNcG$O2V$N%j%9%H$K0zMQId$,IU$$$F$$$k!#b7$3$l$,IU$$$F$$$J1l$P Lis
%?%W%j%?$O **rose** $r4X?t$H7F8F$S=P$7$FI>2A$7h&H9k@m&!#3NNcGO!"$=$&$$$&3Hr7$?$$$N
$+$C$?!#

L@i+$K **cdr** KO **rest** $H$$$&L>A0$NJ}$,!"U5o7$$!#

($3$3GAgC$H6571!#$"J?$,?7$7$$4X?t$KL>A0$rD1$k>l9g!"$=lK$D$$$F6KaFCm0U?<$/9M$($J$$
$J$$!#$H$$$&Nb!"$"$J$?$OB?J,!"$"$J$?$,;W$&$hj:CHD9$$4V!"$=$NL>A0KD$-$^Holk3HKJ
$@!#$3$NJ8>O$G3liNL>A0$r;H$C$F$$$kNO!" Emacs Lisp $N%=!<%9%3!<%I$G3lir;HCF$$$k$+$i
$j!"$=$&$7$J$$$H%3!<%IrFI`N,Di$$$@m&$+$iG"$k!#$7$+$7!"I&$+$"J?<+?HO3li$NC18l$
$$$GM_$7$$!#$=$&9l$P8e$+idCF$-$??M!9$+$i46<U5lk@m&!#)

car $d **cdr** $r **(pine fir oak maple)** $H$$$C$?%7%s%\%k$+iJ$k%j%9%H$K;\$7$?;~!" **car** KhCFJV$5
lkMWAG$O%7%s%\%k **pine** G"$j!"3g8L$OIU$$$F$O$$$J$$!# **pine** O3$N%j%9%H$N:G=i$NMWAG$G$"$k!#7+$

$i!"%j%9%H$N **cdr** $O **(fir oak maple)** $H$$$&%j%9%HG"$k!#$=lO!"<!$N<0$r$$$DbNh&$KI>2A$7F_$
$9$0$KJ,$k!#

```
(car '(pine fir oak maple))

(cdr '(pine fir oak maple))
```

01J}!"%j%9%H$N%j%9%H$G$O!"$=$N%j%9%H$N:G=i$NMWAG$,$=$l<+?H%j%9%HG"$k!#$3$N>l9g!" **car** $O:G=i$
%HH7FNMWAGrJV9!#Nc$($P<!$N%j%9%H$O;0DN%5%V%j%9%H$r4^$s$G$$$k!#3F!9!"Fy?)F0J*!"Ap?)F0J*!
F}N`$N%j%9%H$G$"$k!#

```
(car '((lion tiger cheetah)
       (gazelle antelope zebra)
       (whale dolphin seal)))
```

3N>l9g!":G=i$NMWAG!"$D$^$jA4BN$N%j%9%H$N **car** $OFy?)F0J*$N%j%9%H **(lion tiger cheetah)** G"$k!#$=
$F%j%9%H$N;DjO **((gazelle antelope zebra) (whale dolphin seal))** G"$k!#

```
(cdr '((lion tiger cheetah)
       (gazelle antelope zebra)
       (whale dolphin seal)))
```

$3$3Gb$&0lEY!" **car** $H **cdr** $,HsGK2uE*$G$"$k$H8@$CF*$$$?$[$&$,$$$$$@m&!#3liN4X?t$O%j%9%
2=5;$J$$$N$@!#$3N3HO3liN4X?t$r;H$&K"$?$C$F6K$a$F=EMW$KJk!#

$^$?:G=i$N>O$G%"%H%`$K$D$$$F5DO@$7$?;~$K!" Lisp $G$O!V$"$k<o$N%"%H%`!"Nc$($PG[Ns (array)!"$OJ#?t
J,$KJ,2r=PMh$k!#7+$7!"$=$N%a%+%K%:%`$O%j%9%H$rJ,2r$9$k;~$N%a%+%K%:%`$H$O0c$&!#%j%9%H$NA`:n$K4
$j!"%j%9%H$N%"%H%`$OJ,2rIT2DG=$G$"$k!#!W$H=q$$$?!# (Section 1.1.1, “Lisp Atoms”, p. 1). **car** 4X?t$H
cdr 4X?t$O%j%9%H$rJ,2r9kNK;Hol!" Lisp $N4pK\$H9M$($ilF$$$k!#7+$7!"$3li$N4X?t$OG[Ns$rJ
$?$j!"ItJ,$r<h$j=P7?j9kNKO;H$($J$$!#=>CF!"G[Ns$O%j%9%H$GOJ$/%"%H%`$G$"$k$H9M$(il$
$"$k!#$^$?!"b&0lDN4pK\E*$J4X?t$G$"$k **cons** $b!"%j%9%H$r9=C[9k3H$O=PMh$k$,!"G[Ns$r:nk3$H
$J$$!# (G[Ns$O!"G[Ns$r07$&FC<l$J4X?t$r;H$C$FA`:n$9$k!#>\$7$/$O Section “Arrays” in *The GNU Emacs Lisp Reference Manual*, $r;2>H$N3H!#)

7.2 cons

cons $O!"%j%9%H$r:n$k4X?t$G$"$k!# **car** $d **cdr** HO5U$NF/$-r9kbN@$H8@$($k!#Nc$($P!" **cons** $O;
$NMWAG$r;}$D%j%9%H **(fir oak maple)** $+$i;MDNMWAG$r;}$D%j%9%H$r:n$k3H$,=PMh$k!#D^$j!"

```
(cons 'pine '(fir oak maple))
```

$rI>2A$9kH!"

```
(pine fir oak maple)
```

$H$$$&%j%9%H$,%(%3!<NN0h$KI=<(5l$k!#$3Nh$&$K!" **cons** $O%j%9%H$N@hF,$K?7$7$$0lDNMWAGrIU12C
%j%9%H$KMWAG$rDI2C9ko1G"$k!#

cons KO!"$^$:MWAGrIU12C$($kY-%j%9%H$,I,MW$KJk[1]5L5$$$H3m$+$i%9%?!<%H9k3H$O=PMh$J
$$$NG"$k!#$b$7!"%j%9%H$r:nj?$$$JiP!">/$/$Hb^$:=i$a$K6u%j%9%H$rMQ0U9kI,MW$,$"$k!#<!$K5
$O!" **cons** $rO"B3$7$F;H$C$F2V$N%j%9%H$r:n$kbNG"$k!#$b$7!"$3$NJ8>O$r Emacs $N Info GFIs$G$$$k
$i!"3F!9$N#S<0$r$$$DbNh&$KI>2A$9k3H,=PMh$k!#I=<($5lkHK$b=q$+lF$$$k!#3l$r!V<!$N
h&$KI>2A$5lk!WHCV-49$($FFIsGM_$7$$!#

[1] <B:]$O!"%"%H%`$KMWAG$r **cons** 7F%I%C%HBP$r:n$k3H$b=PMh$k!#$,!"%I%C%HBP$N3HO3$3GO@bL@7
3lKD$$$F$O<!$r;2>H$;$h!# Section “Dotted Pair Notation” in *The GNU Emacs Lisp Reference Manual*.

```
(cons 'buttercup ())
     ⇒ (buttercup)

(cons 'daisy '(buttercup))
     ⇒ (daisy buttercup)

(cons 'violet '(daisy buttercup))
     ⇒ (violet daisy buttercup)

(cons 'rose '(violet daisy buttercup))
     ⇒ (rose violet daisy buttercup)
```

:G=iNNcG$O!"6u%j%9%H$, () $H$$$&7A$G=P$F$$$k!#$=$7$F!" buttercup H3$N6u%j%9%H$+$i?7$7$$%j%9%H
il$k!#8+$lPo$+$k$H;W$&$,!"6u%j%9%H$O:n@.5l$?%j%9%H$NMWAGH7FO=PFMhJ$$!# (buttercup)
$&%j%9%H$,8+$($k$@$1G"$k!#6u%j%9%H$OMWAGH7FO?t$($ilJ$$!#$H$$$&Nb!"6u%j%9%HKOMWAG$,0
$$$+iG$"$k!#0lHLE*$K$$$&$H!"6u%j%9%H$O8+$($J$$$NG"$k!#

FsHVL\$NNcGO (cons 'daisy '(buttercup)) $rI>2A$9k3HG daisy $r buttercup $NA0$KIU$12C$(
$F!"Fs$D$NMWAG$r;}$D%j%9%H$r:nCF$$$k!#;0HVL\$NNcGO daisy $H buttercup $NA0$K violet $r2C$($F
DNMWAG$r;}$D%j%9%H$r:n$C$F$$$k!#

7.2.1 %j%9%H$ND9$5$rD4$Y$k: length

$"$k%j%9%H$,$Il@$1B?$/$NMWAG$r;}D+$r8+$kKO!" length $H$$$& Lisp $N4X?t$r;H$($P$h$$!#<!Nh
46$8$G$"$k!#

```
(length '(buttercup))
     ⇒ 1

(length '(daisy buttercup))
     ⇒ 2

(length (cons 'violet '(daisy buttercup)))
     ⇒ 3
```

;0HVL\$NNcGO!";0DNMWAG$r;}$D%j%9%H$r:n$k$?$a$K cons 4X?t$,;Hol!"$=$N7k2L=PMh$?%j%9%H$, le
4X?t$K0z?t$H7FEO5l$F$$$k!#

length 4X?t$r;H$C$F!"6u%j%9%H$NCf$NMWAG$N?t$r?t$(k3Hb=PMh$k!#

```
(length ())
     ⇒ 0
```

M=A[7?DLj@$H;W$&$,!"6u%j%9%H$NCf$NMWAG$N?t$ONm8D$H?t$($ilk!#

%j%9%H$,L5$$>l9gK=$ND9$5$r5a$a5;F_kN$bLLGr$$<B83G"$k!#$D$^$j!"0z?tH7$F6u%j%9%H$9$
$K length $r8F$S=P9NG"$k!#

```
(length )
```

dCF_lPJ,k,!"3l$rI>2A$9kH!"%(%i!<%a%C%;!<%8$,I=<($5lk!#

```
Wrong number of arguments: #<subr length>, 0
```

3l$O0z?t$N?t$,4V0c$C$F$$$k$H$$$&0UL#$N%a%C%;!<%8$G$"$k!#:#$N>l9g$J$i!"K\Ev$O0lDN0z?t$,EO$5$
PJiJ$$!#Nc$($P0z?t$,%j%9%H$J$i!"$=$N%j%9%H$ND9$5$r3N4X?t$,B,$k3HKJkO$:$@C?NG$"$
%9%H$,Bt;3$NMWAG$r;}$C$F$$$?H7Fb!"0lDN%j%9%H$O0l$D$N0z?t$G$"$k3H$KCm0U!#)

(LuCp!’0x$_$K length $N0z?t$OI,$:$7$b%j%9%H$GJ/Hb$h$$!#Nc$($P length $KJ8;zNs$rEO9H!"$=$
;zNs$ND9$5$,JV$k!#)

%(%i!<%a%C%;!<%8NCfN ‘#<subr length>’ $H$$$&ItJ,$O!"4X?t$NL>A0G"$k!#$3lO!"FC<l$JI=5-K!$G=
lF$$$k!# ‘#<subr’ $O length$, Emacs Lisp GOJ/ C $G=q$+l?%W%j%_%F%#%V$J4X?t$G$"$k3H$rI=$

$F$$$k!# (‘subr’ $O ‘subroutine’ $NN,$G$"$k!#) Section “What Is a Function?” in *The GNU Emacs Lisp Reference Manual*, $K subroutine KD$$$FNh$j>\$7$$>pJs$,$"$k!#

7.3 nthcdr

nthcdr 4X?t$O!" **cdr** 4X?t$K4XO"7?4X?tG"$k!#$3lO!"%j%9%H$N **cdr** $r7+$jJV$7<h$kbNG"$k!#

(pine fir oak maple) $N **cdr** $r<h$k$H!" **(fir oak maple)** $,JV$5lk!#b7$3$NJV5l$?CM$Kb&0l EYF1$8A`:n$r9k$H!" **(oak maple)** $,JV$5lk!# (L^O@!"%j%9%H$K2?2s **cdr** $r;\$7Fb!"85$N%j%9%H$OJQ2 $J$$!# **cdr** $OBP>]%j%9%H$rJQ2=5;O7$J$$$+iG$"$k!#=>CF!" **cdr** $N **cdr** $rI>2A$9kI,MW,$"$k!#) $rB3$1lP!"7k2LH7$F6u%j%9%H$,JV$k!#$3$N>l9g!" **()** GOJ/ **nil** $,I=<($5lk!#

I|=,N?aK!"0J2<$K **cdr** $N7+$jJV7NNc$r=q$$$F$*$NB$KI=<($5lk7k2L$,=q$$$F$"$k!#

```
(cdr '(pine fir oak maple))
     ⇒ (fir oak maple)

(cdr '(fir oak maple))
     ⇒ (oak maple)

(cdr '(oak maple))
     ⇒ (maple)

(cdr '(maple))
     ⇒ nil

(cdr 'nil)
     ⇒ nil

(cdr ())
     ⇒ nil
```

J#?t$N **cdr** $r!"4V$KI=<(5lkCMr64$^$:$KB3$1$F=q$/3H$b=PMh$k!#

```
(cdr (cdr '(pine fir oak maple)))
     ⇒ (oak maple)
```

3N>l9g$O!" Lisp %$%s%?%W%j%?$OFbB&$N%j%9%H$r@h$KI>2A9k!#:G$bFbB&$K$"$k%j%9%HKO0zMQId$,IU$$ NG!"$=$lO=N^$^%j%9%H$H7FJV5l!"FbB&$N **cdr** KEO5lk!#3NFbB&$N **cdr** O3$N%j%9%H$NFsHVI $NMWAG$+iJ$k%j%9%H$rJV$7!"30B&$N **cdr** $KEO$9!#3l$O!"85$N%j%9%H$N;0HVL\0J9_$NMWAG$+$iJk%j%9 9H$$$&o1G"$k!#$3NNcNh&$K!" **cdr** 4X?t$rFs2sB3$1$F;H$&$H!"85$N%j%9%H$N:G=iNFsD$NMWAG$r %j%9%H$,JV$5lk3HKJ$k!#

nthcdr 4X?t$O!" **cdr** 4X?t$r7+jJV7$F;H$&NHF1$8$3Hr7F$/$l$k!#<!$NNcGO0z?t 2 $,%j%9%H$H0l **nthcdr** 4X?tKEO5$l!"$=$N7k2L:G=i$NFsDNMWAG$r=|$$$?%j%9%H$,JV$5lF$$$k!#3lO^5K **cdr** $rFs jJV7$F%j%9%H$K;\$7$?$N$HF1$87k2LG"$k!#

```
(nthcdr 2 '(pine fir oak maple))
     ⇒ (oak maple)
```

85$N 4 DNMWAG$r;}C?%j%9%H$r;HCF!" 0!" 1!" 5 JI$r4^$`$$$m$$$m$J0z?t$r **nthcdr** $KM?$(kH2?$, k+$r8+F_h&!#

```
;; %j%9%H$O$=$N$^$^!#
(nthcdr 0 '(pine fir oak maple))
     ⇒ (pine fir oak maple)

;; :G=i$NMWAG$r=|$$$?;D$j$N%3%T!<$rJV$9!#
(nthcdr 1 '(pine fir oak maple))
     ⇒ (fir oak maple)
```

```
;; ;0$D$NMWAG$r=|$$$?;D$j$N%3%T!<$rJV$9!#
(nthcdr 3 '(pine fir oak maple))
     ⇒ (maple)

;; ;M$DA4It$r=|$$$?;D$j$rJV$9!#
(nthcdr 4 '(pine fir oak maple))
     ⇒ nil

;; $3$l$bA4It$r=|$$$?;D$j$rJV$9!#
(nthcdr 5 '(pine fir oak maple))
     ⇒ nil
```

`nthcdr` $b `cdr` $HF1MM$K85$N%j%9%H$rJQ2=5;$J$$$3HK018@?(1F$*$/$[$&$,$$$$$@m&!#3N4X?t$b HsGK2uE*$JNG$"$k!#3l$O `setcar` 4X?t$d `setcdr` 4X?tHOC-$j0c$C$F$$$kH3mG$"$k!#

7.4 setcar

3NFsDNL>A0$+$iO"A[5lkh$&$K!" `setcar` $H `setcdr` $H$$$&4X?t$O!"%j%9%H$N `car` $d `cdr` $K?7$7$ CM$r;}$?$;$k!#3liO `car` $d `cdr` $,CM$rJQ2=5;$J$$$NHO0[Jj!"<B:]$K85$N%j%9%HNCMrJQ2=5;$ $&!#$3l,I&$$$&3HJN$+$r8+$k01$D$NJ}K!$O!"<B83$7$F$_$k3H$@$m$&!#$^$:$O `setcar` 4X?t$+$i; $_$h$&!#

:G=i$K%j%9%H$r:n$j!" `setq` $r;H$CF"$kJQ?t$NCMK=$N%j%9%H$r%;%C%H9k!#F0J*$N%j%9%H$GdCF_$

```
(setq animals '(giraffe antelope tiger lion))
```

GNU Emacs $N Info G3$NJ8>O$rFIsG$$$kJi!"3N#S<0$r$$$DbNh&$KI>2A$7F_h&!#%+!<%=%k$ <0$N8e$K;}CF$$$-!" `C-x C-e` $H%?%$%W9kNG$"$k!# (;dO3$&=q$/;~KO<B:]K3$NA`:n$r;n7F$$$ lO7W;;5!4D6-$K%$%s%?%W%j%?$,AH9~$^lF$$$k3H$NMxE@$N0lDG$"$k!#)

JQ?t `animal` $rI>2A$7F_lP!"3NJQ?t$, `(giraffe antelope tiger lion)` $H$$$&%j%9%H$K%P%$%s%I 5l$F$$$k3H$,3N$+ailk!#

```
animals
     ⇒ (giraffe antelope tiger lion)
```

JL$N8@$$J}r9lP!"JQ?t `animal` $O%j%9%H `(giraffe antelope tiger lion)` $r;X$7$F$$$kHb8@$($k!#

<!$K!"4X?t `setcar` $KJQ?t `animal` $H0zMQIdIU$-$N%7%s%\%k `hippopotamus` NFsD0z?trEO7$FI>2A$7F h&!#3l$O;0$D$NMWAG$r;}$D `(setcar animals 'hippopotamus)` $H$$$&%j%9%H$r=q$$$F!"3l$r$$$DbN h&$KI>2A$9k3HG9T$&$3H,=PMh$k!#

```
(setcar animals 'hippopotamus)
```

3N#S<0$rI>2A$7$?8e$G!"JQ?t `animals` rb$&0lEYI>2A$7F_h&!#9k$H!"F0J*$N%j%9%H$,JQ2=$7$F$$$ $,J,$k!#

```
animals
     ⇒ (hippopotamus antelope tiger lion)
```

%j%9%H$N:G=i$NMWAG `giraffe` $, `hippopotamus` KJQoCF$$$k!#

0J>eN3H+$iJ,$kh&$K!" `setcar` $O `cons` Nh$&$K?7$7$$MWAGrIU12C$($kNGOJ$/!"C1$K `giraf` $r `hippopotamus`$KCV-49($F$$$k$@$1G"$k!#B($A!"3N4X?t$O%j%9%H$N:G=i$NMWAG$rCV-49(kN$@!#

7.5 setcdr

`setcdr` 4X?t$b!" `setcar` 4X?t$H;w$F$$$kN@$,!"$3Ai$O%j%9%H$N:G=i$NMWAG$GOJ$/!"FsHVL\0J9_$NN rCV-49$($k!#

<B:]INh&$KF/$/$+$r8+k?aK!"$^$:<!$N#S<0$rI>2A7F!"JQ?tNCMr2HC\$N%j%9%H$K%;%C%H$7F*

```
(setq domesticated-animals '(horse cow sheep goat))
```

3N;~E@G3$NJQ?t$rI>2A7?Ji!"%j%9%H (horce cow sheep goat)$,JV$5lkO:$@!#

```
domesticated-animals
     ⇒ (horse cow sheep goat)
```

<!$K!" setcdr $K!"$3$N%j%9%H$rCM$K;}$DJQ?tL>H=$N%j%9%H$N cdr $NItJ,$rCV-49($k%j%9%H$NFsDN
$rM?$($F!"I>2A$7F_$k!#

```
(setcdr domesticated-animals '(cat dog))
```

3N#S<0$rI>2A$9kH!"%j%9%H (cat dog) $,%(%3!<NN0h$KI=<(5l$k!#$3l,3N4X?tKhCFJV5l$kC
$k!#2f!9$KHC$F6=L#$,$"$kNOI{:nMQ$NJ}$G$"$k$,!"$3Ai$OJQ?t domesticated-anmimal $rI>2A$7F_
PIsJbN$+M}2r=PMh$k!#

```
domesticated-animals
     ⇒ (horse cat dog)
```

<B:]!"3N%j%9%H$O (horse cow sheep goat) $+$i (horce cat dog) $KJQ2=$7$F$$$k!#3N%j%9%H$N cdr
$, (cow sheep goat)$+$i (cat dog) KCV-49oC$F$$$kNG$"$k!#

7.6 N}=,LdBj

;M<oN`$ND;$N%j%9%H$r4v$D$+$N cons $r;H$C$?#S<0$rI>2A9k3H$G:n$jJ5$$!#$^$?!"$"$k%j%9%HK=
$r cons 7?;~$K!"2?$,5/$-k+$r8+J5$$!#;M<oN`$ND;$N%j%9%H$N:G=i$NMWAG$r5{$GCV-49(J5$$!#99
$N%j%9%H$N;DjNMWAG$bB>$N5{GCV-49$($J$5$$!#

8 %F%-%9%H$N@Z<h$j$HJ]B8

GNU Emacs $G ‘kill’ %3%^%s%I$r;HCF%P%C%U%!$+$i%F%-%9%H$r%+%C%H$J$$$7$O@Z$j<hC? (clip 7?) >
9g!">oK=$N>pJs$O%j%9%HH7$FJ];}$5lF$*$j!"$=$l$r%d%s%/ (yank) %3%^%s%I$G<h$j=P$9$3$H$,=PMh$k!

(Emacs GFCK2?i+$N<BBN$rGK2u7J$$%W%m%;%9KBP7$F ‘kill’ $H$$$&8@MU$r;H$&NO!"IT9,$JNr;KE*
;vG"$k!#$3lK$O ‘clip’ $H$$$&C18l$NJ}$,$:$CHU5o$7$$!#3l3= kill %3%^%s%I$,$dCF$$$k3H$
iJ$$$+iG$"$k!#3N%3%^%s%I$O%P%C%U%!$+$i%F%-%9%H$r ‘clip’ $7!"$=lr$^$?<h$j=P$9$3$H$,=PMh$k$
CV>l=j$K0\$7$F$$$kN@!#;dO7P7$P Emacs $N%=!<%9$NCf$K=P$F$/$k$"$ifk ‘kill’ $r ‘clip’ $K!"$"i
‘killed’ $r ‘clipped’ KCV-49$($?$$>WF0K+il$k!#)

%F%-%9%H$,%P%C%U%!$+$i@Z$j<hil$?>l9g!"$=$N%F%-%9%H$O$"$k%j%9%H$KJ]B8$5lk!#<!K^$?%F%-%9%
<hjk$H!"$=$N%F%-%9%H$b$^$?3N%j%9%HNCfKB3$1$FJ]B8$5$l$k!#=>$C$F%j%9%H$O<!Nh$&$KJk!#

```
("a piece of text" "last piece")
```

4X?t **cons** $r;H$($P!"0J2<$Nh&$K!"$3$N%j%9%H$K%F%-%9%H$r2C$(k3H,=PMh$k!#

```
(cons "another piece"
      '("a piece of text" "last piece"))
```

3N#S<0$rI>2A$9kH!"<!$N;0$D$NMWAG$r;}$D%j%9%H$,%(%3!<NN0h$KI=<($5lkO:$@!#

```
("another piece" "a piece of text" "last piece")
```

4X?t **car** $d **nthcdr** $r;H$&$H!"$3NCf+iI$NItJ,$G$b<h$j=P$9$3H,=PMh$k!#Nc$($P<!$K5s2k%3!<%I
nthcdr 1 ... $,:G=i$NMWAG$r=|$$$?%j%9%HrJV7!" **car** $,$=$N;D$j$N%j%9%H$NCf$N:G=i$NMWAG — 85!9$N%j%
GOFsHVL\$NMWAG — rJV9!#

```
(car (nthcdr 1 '("another piece"
                 "a piece of text"
                 "last piece")))
     ⇒ "a piece of text"
```

L^O@!"<B:]$K Emacs $G;H$olF$$$k4X?tO3lhjbbC$HJ#;($G$"$k!#%F%-%9%H$r%+%C%H$7$?$j<h$
$?$j9k$?$a$N%3!<%I$O Emacs $,$"J?$,<h$j=P7?$$%F%-%9%H$,$Il+J,kh$&$K=q$+$l$F$$$J1lP
$$!#$=$l$,0lHVL\$K$"$m$&$HFsHVL\$K$"$m$&$H;0HVL\$K$"$m$&$H!"$"$k$$$ObC$HB>$N>l=jK"CFbG$
$?!"$b$7%j%9%H$N:G8e$^$GMh$?>l9g!"$=3G=*ojHO$;$:$K:FEY:G=i$NMWAGKLaiJ/FOJk$^$$!#

%F%-%9%H$NItJ,$rJ]B8$7$F$$$k%j%9%H$O *kill* %j%s%0 (*kill ring*) $H8F$Plk!#3N>OGO>/7:$D kill %j%s%
$D$$$FOC7F$$$/3HK9$k!#$=N?aK!"$^$: **zap-to-char** 4X?t$,$INh$&$KF/$/$+$r8+$k3H$G!" ki
%s%0$N;H$$J}$r8+$F$$$-$?$$$H;W$&!#;3$ND:>e$rL\;X$9A0K^$:<j:"$J5VKEPCF_ko1G$"$k!#

<B:]$K%F%-%9%H$,INh&$K%P%C%U%!$+$i@Z$j<hil!"0?$$$O<h$j=P$5lkN+KD$$$F$O!"<!$N>O$G
$k!# Chapter 10, “Yanking Text Back”, p. 81, ;2>H!#

8.1 zap-to-char

zap-to-char 4X?t$O!" GNU Emacs $N version 18 $H version 19 HG$O0[Jk=q$-J}$,$5lF$$$k!#
version 19 GN<BAu$NJ}$,C1=c$G!"$AgCH@$10c$C$?F0:n$r9k!#$^$:$O version 19 MQ$K=q$+$l$?J}$r
$F!"$=$N8e$K version 18 $NJ}$r8+k3HK7h$&!#

%$%s%?%i%/%F%#%V4X?t **zap-to-char** $N Emacs version 19 MQ$N<BAuGO!"%+!<%=%k$N0LCV ($D$^$j%]%$%s%
$N0LCV) $+$i<!$K;XDj$7$?J8;z$,8=lk$^$G$N!"$=$NJ8;z$b4^a?NN0h$N%F%-%9%H$r<h$j5n$k!# **zap-to-cha**
hC$F<h$j=|$+$l$?%F%-%9%H$O!" kill %j%s%0KCV+lk!#3l$O **C-y** (**yank**) $H%?%$%W9k3H$G<h$j=P$9
$,=PMh$k!#b7!"3N%3%^%s%I$,0z?t$H6&$K8F$S=P5l$?$J$i!"$=$N2s?t$@$1;XDj$5l?J8;z$,=P$F$/$k$
$N%F%-%9%H$r<h$j5n$k!#=>CF!"b7%+!<%=%k$,<!$NJ8$N@hF,$K$"$j!"FCDj$NJ8;z$, ‘s’ $@$C$?$H9k$H!"
$,<h$j5nilk3HKJk!#

Thus, if the cursor were at the beginning of this sentence and the character were 's', 'Thus' would be removed.

(LuCp!'F|K\8l$NJ8>O$G$O zap-to-char $O;H$($J$$$N$G!";_$`J/1QJ8N^$^$K7?!#)

$^$?b70z?t$, 2 G"lP!" 'Thus, if the curs' $,<h$j5nil$k!#$3$3$G$b:G8e$N 's' $,4^$^lF$$$k$
HKCmL\$7h&!#

Emacs version 18 GN<BAuGO!";XDj7?J8;z$^$GN=$NJ8;z$r4^$^$J$$NN0h$r<h$j5nkh$&$KJC$F$$$
=>CF!"@h$N%Q%i%0%i%U$GNNcG$O!" 's' $O<h$j=|$+$l$J$$!#

99$K Emacs $N version 18 GN<BAuGO!"b7;XDj7?J8;z$,8=$lJ+C?>l9gKO%P%C%U%!$N:G8e$^$G%
%=%k$,0\F0$7$?!#$7$+$7!" version 19 $NJ}$G$OC1$K%(%i!<rJV9$@$1G"$k!# (=>$C$F!"%F%-%9%H$r<h$j=
jb7J$$!#)

Il$@$1$N%F%-%9%H$r<h$j5n$k$+$r7hDj9k$?$a$K!"$IAi$N%P!<%8%g%s$N>l9gGb8!:w4X?t$r;H$CF
:wObCQ$i%F%-%9%H$r07$&%3!<%I$NCf$G;H$olk!#$=$7$F!":o=|%3%^%s%I$@1GJ/8!:w4X?tKbCmL\$
0UL#N"k3HG$"$k!#

0J2<$, version 19 GN3N4X?t$N40A4$J%3!<%IG"$k!#

```
(defun zap-to-char (arg char)  ; version 19 implementation
  "Kill up to and including ARG'th occurrence of CHAR.
Goes backward if ARG is negative; error if CHAR not found."
  (interactive "*p\ncZap to char: ")
  (kill-region (point)
               (progn
                 (search-forward
                  (char-to-string char) nil nil arg)
                 (point))))
```

8.1.1 interactive <0

zap-to-char %3%^%s%IFb$N%$%s%?%i%/%F%#%V<0$O!"<!$NDLjG$"$k!#

```
(interactive "*p\ncZap to char: ")
```

0zMQIdNCfNItJ,$O!" "*p\ncZap to char: " G"$j!";0$DN3Hr;XDj7F$$$k!#0lHVL\$NItJ,$OC1$J
%"%9%?%j%9%/ '*' $G!"%P%C%U%!$, read-only $@$C$?$i7Y9pN?aK%(%i!<$r=P$9$?$aNbNG$"$k!#D^
read-only $J%P%C%U%!$G zap-to-char $r;H$*$&$H7F$b%F%-%9%H$r<h$j=|$/3H$O=PMh$:!"Beoj$K "buffe
is read-only" $H$$$&%a%C%;!<%8$r<u$1<hk3HKJk3H$r0UL#$9$k!#C<Kv$KhCFO%S!<%W2;bJ$k!#

*p\ncZap to char: " $NFsHVL\$NItJ,$O 'p' G"$k!#3NItJ,$O2~9T '\n' $G=*$C$F$$$k!# 'p' O3$N4X?t$N
:G=i$N0z?t$H7F!"=hM}5l$?A0CV0z?t$NCM$,EO$5lk3H$r0UL#$9$k!#A0CV0z?t$O C-u $KB3$$$F$"$k?t
7/$O M- $KB3$$$F$"$k?t$r%?%$%W9k3HGEO5lk!#b7!"3N4X?t$,A0CV0z?t$J7G8F$S=P$5l?>l
$,0z?t$H7FEO5l$k!#

*p\ncZap to char: " $N;0HVL\$NItJ,$O!" 'cZap to char: '$G$"$k!#3NItJ,$N:G=i$N>.J8;z$N 'c' $O
interactive $,%W%m%s%W%H$r=P7F!"J8;z$NF~NO$rMW5a9k3H$r;X<($9kbNG$"$k!#%W%m%s%W%H$O 'c
8e$KB3$/bN$G!"$3$N>l9g$OJ8;zNs 'Zap to char: 'G"$k!# (%3%m%s$N8e$N6uGr$O!"C1$K8+1I$(rh$/$9$k
NbNG$"$k!#)

7k6I3l$,$9k3HO!"@5$7$$7?$N zap-to-char $N0z?t$rMQ0U$7!"%f!<%6!<$KBP7F%W%m%s%W%H$r=P$9
$&$3HG$"$k!#

8.1.2 zap-to-char $NK\BNItJ,

zap-to-char 4X?t$NK\BNItJ,$O!"8=:_$N%+!<%=%k$N0LCV$+$i;XDj7?J8;z$^$G$N4V$NNN0h$N%F%-%9%H$r:
$k%3!<%I$r4^sG$$$k!#$=$N:G=i$NItJ,$O<!NDLjG"$k!#

    (kill-region (point) ...

(point) $O8=:_$N%+!<%=%k$N0LCV$G$"$k!#

3N8eKO!" progn $r;H$C$?<0$,B3$$$$F$$$k!# progn $NK\BNItJ,$G$O!" search-forward $H point $r8F
$S=P$7$F$$$k!#

$^$: search-forward $r3X$sG+iNJ}$, progn $NF/$-$rM}2r$7d9$$$N$G!"@h$K3Air8+$F!"<!$
progn KD$$$F=RYk3HK7h&!#

8.1.3 4X?t search-forward

search-forward 4X?t$O!" zap-to-char NCfG!":o=|9kHO0O$NC<$rDjakJ8;z (0J2< zapped-to-character $H=q$/) $N0LCV$rDjakNK;Hol$F$$$k!#b78!:w$,@.8y$9kH!" search-forward $OL\E*$
J8;zNs$N:G8e$NJ8;zN9$08e$K%]%$%s%H$r0\F0$9$k!# (:#$N>l9g!"L\E*$NJ8;zNsOAg&$I01J8;z$G$"$k!#
8!:w$,8eJ}$K8~$+$&bNG"lP!" search-forward $OL\E*$NJ8;zNs$N:G=i$N01J8;zN9$0A0$K%]%$%s%H$
F0$9$k!#$^$?!" search-forward <+?HOCMH7F t rJV9!# (=>CF!"%]%$%s%H$N0\F0$OI{:nMQ$G$"$k!#)

zap-to-char NCfG search-forward $O<!$Nh&$K;H$olF$$$k!#

    (search-forward (char-to-string char) nil nil arg)

4X?t search-forward $O;M$D$N0z?t$r<h$k!#

1. :G=i$N0z?t$O!"8!:w7h$&$H9k%?!<%2%C%HG"$k!#$3lO '"z"' Nh$&$KJ8;zNsGJ1lPJiJ$$
   :#2s$N>l9g$O!"$?$^$?$^ zap-to-char KEO5lk0z?t$OC1FH$NJ8;zG"$k!#7W;;5!$N@_7W>e!" Lisp %$
   %?%W%j%?$OC1FH$NJ8;z$r01J8;z$+iJ$kJ8;zNs$H$O6hJL$7$F07$&!#7W;;5!NCfG$OC1FH$NJ8;z$O01J8
   JkJ8;zNsHOJL$NEE5$E*$J%U%)!<%^%C%H$r;}CF$$$kNG$"$k!# (C1FH$NJ8;z$O$?$$$F$$7W;;5!$NCf
   %$%H$G5-O?5l$F$$$k!# (LuCp!'L^O@F|K\8lH+GO;v>pOJLG$"$k!#) 7+$7!"J8;zNs$NJ}$OD9$$$b$
   lPC;$$$bNb$"$kNG!"7W;;5!$NJ}$G$=$lKHw(J1lPJi$J$$$NG"$k!#) search-forward $OJ
   Ns$r8!:w$9kbNJNG!" zap-to-char 4X?t$K0z?t$H7FEO5l$?J8;z$r7W;;5!$NFbIt$GJL$N%U%)!<$
   %H$KJQ49$7$J$$$H$$$1$J$$!#GJ$$$H!" search-forward $O8!:w$K<:GT7F7^$&!#$3$NJQ49$r9k$
   $K!" char-to-string $H$$$&4X?t$,;H$olF$$$k!#
2. FsHVL\$O!"8!:w$NHO0O$r;XDj9k$?$aNbNG$"$k!#3l$O%P%C%U%!Fb$N0LCVH7$F;XDj$5lk!#:
   9g!"8!:w$O%P%C%U%!$N:G8e$^$G9T$&$N$G!"HO0O$r@)8B7?jO7J$$!#=>CF!"FsHVL\$N0z?t$O nil
   $k!#
3. ;0HVL\$O!"3N4X?t$K8!:w$,<:GT$7>l9g$KI&9k$+ — 7Y9p$7$F%(%i!<$rI=<(9k$+!"C1$K nil $rJV
   — rEA(kbNG$"$k!# ;0HVL\$N0z?tH7$F nil $,;XDj$5lF$$$k$H!"8!:w$K<:GT7?>l9gKO%(%i
   =P7F7Y9p9k!#
4. search-forward $N;MHVL\$N0z?t$O!"7+$jJV7N2s?t — D^$j8!:wBP>]$NJ8;zNs$,2?2s8=$lkN$rD4$Y
   $+ — $r;XDj$9kbNG$"$k!#3N0z?t$O>JN,2DG=$G$"$j!"b7$3$N0z?tJ7$G4X?t$,8F$S=P$5l?>l9
   $N0z?t$H7F 1 $,EO$5lk!#0z?t$,Ii$G$"$l$P!"8!:w$O8eJ}$K8~$+CFJ5lk!#

%F%s%W%l!<%H$G=q$/$H!" search-forward <0$O<!Nh$&$KJk!#

    (search-forward "*target-string*"
                    limit-of-search
                    what-to-do-if-search-fails
                    repeat-count)

<!$K progn $r8+$k3HK7h&!#

8.1.4 4X?t progn

progn $O0z?t$r3F!9=gHV$KI>2A$7$F$$$-!":G8e$N<0$NCMrJV9h&$J4X?t$G$"$k!#$=$l0JA0$N#S<0$O$=$
MQN?a@1KI>2A5l!"3li,JV$9CM$OL5;k5l$k!#

progn <0$N%F%s%W%l!<%H$O6KaFC1=cG"$k!#

```
(progn
  body...)
```

zap-to-char NCfG$O!" **progn** <0$OFsDN3H$r9T$&!#$^$:!"%]%$%s%H$rAg$&$I@5$7$$0LCVKCV/3
<!$K!"%]%$%s%H$N0LCV$rJV7F!" **kill-region** $,$I3^$G%F%-%9%H$r:o=|9lPh$$$+$r65$(k3HG$"$

progn $N:G=i$N0z?t$O **search-forward** G"$k!# **search-forward** $O8!:w$9$kJ8;zNs$r8+D1$?>l9g!"
$=$NJ8;zNs$N:G8e$NJ8;zN9$08e$K%]%$%s%H$r0\$9!# (:#$N>l9g!"8!:wJ8;zNs$O0lJ8;zG"$k!#) $?$@$7!"
:w$,8eJ}J}8~$J$i:G=i$N0lJ8;z$ND>A0$N0LCV$K%]%$%s%H$r0\$9!#%]%$%s%H$N0\F0$OI{:nMQ$G$"$k!#

FsHVL\$N!"$=$7$F:G8e$N **progn** $N0z?t$O **(point)** G"$k!#$3$N#S<0$O%]%$%s%H$N0LCVrJV9!#:#$N>l9
$i!"$3lO **search-forward**KhCF0\F0$5$l$?%]%$%s%H$N0LCV$G$"$k!#3NCM$, **progn** <0$NCMH7$FJV
$l!" **kill-region** $K **kill-region** $NFsHVL\$N0z?tH7FEO5lk!#

8.1.5 zap-to-char KD$$$F$NAm3g

5F!"0J>e$G **search-forward** $H **progn** $NF/$-$r8+$F$-$?!#$3$3$G **zap-to-char** A4BN$,INh&$KF0:n
9k$+$r8+k3HK7h$&!#

zap-to-char %3%^%s%I$,M?$(il$?;~$N **kill-region** $N:G=i$N0z?t$O%+!<%=%k$N0LCV — $=$N;~E@GN%
%$%s%H$NCM — G"$k!#$^$? **progn** NCfG8!:w%3%^%s%IKhCF%]%$%s%H$, zapped-to-character N9$08e$
0\$5$l!" **point** KhCF$=$N0LCVNCM,JV5l$k!# **kill-region** 4X?t$O3liFsDNCMN:G=iNCMr%j!<%
%s$N;O$^jK!"FsHVL\$NCM$r%j!<%8%g%s$N=*oj$K;XDj$7$F!"$=$N%j!<%8%g%s$r:o=|9k!#

progn 4X?t$,I,MW$JNO!" **kill-region** 4X?t$N0z?t$,FsDG$"$k$+$iG"$k!#2>$K **search-forward** <0
$H **point** <0$,B3$1$FFsDN0z?tH7$F=q$+lF$$$?H7$?$i!"$&$^$/F0:n$7FO$/$l$J$$!# **progn**$O **kil-
region** KHCF0lDN0z?tG"$j!" **kill-region** $,BhFs0z?t$H7FI,MW$J0l$DNCMrJV9NG"$k!#

8.1.6 Version 18 GN<BAu

zap-to-char $N version 18 GN<BAu$O version 19 GN<BAuHOAgCHP+$j0c$C$F$$$k!#3Aib
zapped-to-character $^$G$N%F%-%9%H$r:o=|9kN@$,!"$=lK$O zapped-to-character <+?H$O4^$a$J$$!#$^
$?!";XDj$5l?J8;zNs$,8+$D$+$i$J$$>l9gKO%P%C%U%!$N:G8e$^$G:o=|$7F7$^$&!#

0c$$$O **kill-region** $NBhFs0z?t$K$"$k!# Version 19 GN<BAuGO<!Nh$&$KJC$F$$$?!#

```
(progn
  (search-forward (char-to-string char) nil nil arg)
  (point))
```

7+$7 version 18 GO<!Nh$&KJCF$$$k!#

```
(if (search-forward (char-to-string char) nil t arg)
    (progn (goto-char
            (if (> arg 0) (1- (point)) (1+ (point))))
           (point))
  (if (> arg 0)
      (point-max)
    (point-min)))
```

3lO+JjJ#;($K8+$($k!#$7$+$7!"3F!9$NItJ,$OMF0W$KM}2r$9k3H,=PMh$k!#

:G=i$NItJ,$O3$&$@!#

```
(if (search-forward (char-to-string char) nil t arg)
```

3l$O<!$N;E;vr9kh$&$J **if** <0$N%F%s%W%l!<%H$K$-$AsEvFO^CF$$$k!#

(if *able-to-locate-zapped-to-character-and-move-point-to-it*
  then-move-point-to-the-exact-spot-and-return-this-location
 else-move-to-end-of-buffer-and-return-that-location)

if <0$rI>2A$9k3HG!" **kill-region** $NFsHVL\$N0z?t$,;XDj$5lk!#:G=i$N0z?t$H7F$O%]%$%s%H$N0LCV
$($ilkNG!"3li+$i!" **kill-region** $O%]%$%s%H$+$i zap 9k0LCV$^$G$N%F%-%9%H$r:o=|=PMh$k!#

search-forward $,I{:nMQ$H7FINh&$K%]%$%s%H$r0\F0$9k+KD$$$F$O!"4{$K@bL@7?N@C
search-forward Ob$78!:w$K@.8y7?Ji **t** rJV9!#<:GT7?>l9g$K **nil** rJV9$+!"%(%i!<%a%C%;!<%8
=P9+$O **search-forward** $N;0HVL\$N0z?tKh$k!#:#$N>l9g;0HVL\$N0z?t$O **t** JN$G!"8!:w$K<:GT9k$H **r**
$,JV$k!#8e$G8+$kh&$K!" **nil** $,JV$5lk>l9g$N%3!<%I$N07$$$O4JC1G"$k!#

zap-to-char $N version 18 GN<BAuGO!"8!:w$O **if** <0$N??56%F%9%H$NItJ,$G8!:wN?aN#S<0$,I>2A$5$
k3HKhC$F5/F0$5lk!#b78!:w$K@.8y$9lP Emacs $O **if** <0$N then-part $rI>2A$9$k!#0lJ}!"$b$78
$K<:GT$9lP!" Emacs $O else-part $NJ}$rI>2A9k!#

if <0NCfG8!:w$,@.8y$9lP!" **progn** <0$,<B9T$5lk — D^$j%W%m%0%i%`$H7FAvi5lk!#

A0Kb8@C?h&$K!" **progn** $O0z?t$r=g$KI>2A$7$F$$$-!"$=$N:G8e$N#S<0$NCMrJV94X?tG"$k!#$=$l0
#S<0$OC1$KI{:nMQ$@$1N?aKI>2A5l!"$=$li,JV$9CM$O<NFilk!#

>e$G@bL@$7$?$h$&$K!"3N%P!<%8%g%s$N **zap-to-char** GO **progn** <0$O **search-forward** 4X?t$,8!:w$9$k
J8;z$r8+$D1?>l9g$K<B9T$5lk!# **progn** <0OFsDN3Hr<B9T7J1lPJiJ$$!#0lDO%]%$%s%H$r(
0LCV$K0\F0$9k3HG$"$j!"b&0lDO$=$N0LCVrJV9$3$HKh$j **kill-region** KI3^$G:o=|$9lP$h
rEA(k3HG$"$k!#

progn $,;H$olkM}M3$O **search-forward** $,8!:wJ8;zNs$r8+D1$?>l9g$K!"L\E*$NJ8;zNs$N:G8e$NJ8;z$N
8e$^$G%]%$%s%H$r0\F0$7$F7^$&$3HK$"$k!# (:#$N>l9g$OL\I8HJ$kJ8;zNs$O0lDNJ8;zG"$k!#) $^$?
$,8eJ}J}8~$N>l9g$O!" **search-forward** $O%]%$%s%H$rL\E*$NJ8;zNs$N:G=i$NJ8;z$ND>A0$KCV$$$F7^$&!#

7+$7!"$3$N%P!<%8%g%s$N **zap-to-char** $O8!:w$7$?J8;z<+?H$O:o=|7J$$$h$&$KJC$F$$$k!#Nc$($P **z**
to-char $, 'z' $H$$$&J8;z$^$G$N%F%-%9%H$r:o=|9k>l9g!"3N%P!<%8%g%sNbNG$O 'z' $H$$$&J8;z$O
7F$O$$$1$J$$!#$=$3$G!"%]%$%s%Hr=$NJ8;z$r:o=|7J$$$h$&$J=j$^$G0\F0$7$J1lPJiJ$$$H$$$&$
$k!#

progn <0$NK\BN

progn <0$NK\BN$OFsDN#S<0$+$iJC$F$$$k!#0[JkItJ,4V$N6h@Z$rL@3NK9k?aK4V$r6u$1$F!"99$
%s%H$r2C$(kH!" **progn** <0$O<!$Nh&KJ$k!#

```
(progn

  (goto-char                    ; progn $N:G=i$N<0!#
        (if (> arg 0)           ; $b$7 arg $,@5$J$i!"
            (1- (point))        ;   0lJ8;zJ,La$j!"
          (1+ (point))))        ;   $=$&$G$J$1$l$P0lJ8;zJ,?J$`!#

  (point))                      ; progn $NFsHVL\$N<0!#
                                ;   %]%$%s%H$N0LCV$rJV$9!#
```

3N **progn** <0$,$dk3HO<!NDLjG"$k!#$b$78!:w$,A0J}Ji$P!" ($D$^$j **arg** $,@5$N?tJi) Emacs $
:w7?J8;z$ND>8e$K%]%$%s%H$r0\F0$7$F$$$k!#$=$3$G0lJ8;zJ,A0$KLak3HG!"$=$NJ8;z$rBP>]HO0O$+$i=
$N>l9g!" **progn** <0$NCf$N#S<0$O<!Nh$&$KFIak!# **(goto-char (1- (point)))** !#3l$O%]%$%s%H$N0LCV$r
0lJ8;zJ,$@$1La$9!# (**1-** $H$$$&4X?t$O0z?t$+$i 1 $r0z$/4X?tG"$k!#F1MM$K **1+** $O0z?t$K 1 $rB-$9!#) 0lJ}!"
zap-to-char $N0z?t$,IiJi$P!"8!:w$O8eJ}$K8~$+CF9Tol$k!# **if** $,$3lr8!CN$7!"$3$N>l9g$O **(got**
char (1+ (point))) $H$$$&#S<0$,<B9T$5lk3HKJ$k!# (7+$jJV7KJk$,!" **1+** $O0z?t$K 1 $r2C$($k4X
G"$k!#)

progn $NFsHVL\$N!"$=$7$F:G8e$N0z?t$O!" (point) $H$$$&#S<0G"$k!#$3$N#S<0$O **progn** $N:G=i$N0z?t
hC$F0\F0$7$?%]%$%s%H$N0LCV$rJV$9!#$3NCMO3N#S<0$r4^$` **if** <0KhCFJV5l!" **kill-region** $N
0z?tH7FEO5lk!#

<jC;K^HakH!"3N4X?t$NF/$-$O0J2<$NDLjG$"$k!# **kill-region**$N:G=i$N0z?t$O **zap-to-char** %3
%s%I$,M?$(il$?;~$N%+!<%=%k$N0LCV — D^j=$N;~E@GN%]%$%s%H$N0LCV — G"$k!#8!:w$K@.8y9l$
$r9T$&4X?t$,$=3^$G%]%$%s%H$r0\F0$9$k!#$=7F **progn** <0KhCF!";XDj7?J8;z$,:o=|$9$kNN0h$KF~
h&$K%]%$%s%H$N0LCV$r$:$i7F$+$i!"$=$N0LCVrJV9!#$=$7$F!" **kill-region** 4X?t$,$=$N%j!<%8%g%s$r
9k$H$$$&o1G"$k!#

:G8e$K!" **if** <0$N else-part $G!";XDj$7$?J8;z$,8+D+iJ$+$C$?>l9g$NBP=hr7$F$$$k!# **zap-to-char**
?t$N0z?t$,@5G"$k>l9g ($b7/$O0z?t$,M?$($ilF$$$J$+$C$?>l9g)!";XDj$7$?J8;z$,8+D+iJ1l$P
;~$N%+!<%=%k$N0LCV$+$i@h$N%"%/%;%92DG=$JHO0O$NA4$F$N%F%-%9%H ($b$7%J%m!<%$%s%0$,$+$+$C$F$$$J1l
%U%!$N:G8e$^$G) $,:o=|$5lk!# **arg** $,Ii$N>l9g$O!";XDj$7$?J8;z$,8+D+iJ1l$P>e$NA`:n$,$=$N;~$K
%92DG=$JHO0O$N;OaNJ}$K8~$C$F9T$olk!#3NItJ,$N%3!<%I$OC1=c$J **if** <0$G$"$k!#

```
(if (> arg 0) (point-max) (point-min))
```

3l$O!"$b$7 **arg** $,@5$N?tJi!" **point-max** $=$&GJ1l$P **point-min** NCMrJV$9$3HrI=7F$$$k!#

I|=,N?aK!"%3%a%s%HIU$-$G **kill-region** $r4^$`%3!<%I$r5s$2F*3&!#

```
(kill-region
 (point)                    ; %j!<%8%g%s$N;O$^$j
 (if (search-forward
      (char-to-string char) ; 8!:wBP>]
      nil                   ; 8!:w$N8B3&: L5$7
      t                     ; <:GT$7$?$i nil $rJV$9!#
      arg)                  ; 7+$jJV$7$N2s?t
     (progn                 ; then-part
       (goto-char
        (if (> arg 0)
            (1- (point))
          (1+ (point))))
       (point))

   (if (> arg 0)            ; else-part
       (point-max)
     (point-min))))
```

3l$r8+$lPo$+$kh&$K!" version 19 GN<BAu$O!" version 18 GN<BAuhjbdk3H,AgCH>/$
$,!"$=$NJ,%3!<%I$O$:$C$HC1=c$KJC$F$$$?NG$"$k!#

8.2 kill-region

zap-to-char $O **kill-region** 4X?t$r;HCF$$$k!#3lOHFbC1=c$J4X?t$G!"@bL@J8;zNs$N0lIt$r>JN,
kH!"<!Nh$&$K=q$+$l$F$$$k!#

```
(defun kill-region (beg end)
  "Kill between point and mark.
The text is deleted but saved in the kill ring."
  (interactive "*r")
  (copy-region-as-kill beg end)
  (delete-region beg end))
```

<g$KCmL\$9Y-E@$O **delete-region** $H **copy-region-as-kill** $r;H$C$F$$$kH3mG$"$k!#3liN4X
?tKD$$$F$O0J9_$N%;%/%7%g%s$G@bL@$9$k!#

8.3 delete-region: AgCHC&@~7F C NOCr

zap-to-char %3%^%s%I$O **kill-region** 4X?t$r;HCF$$$k!#$=$7$F!"$3lO3lG^$?JL$NFsDN4X? **copy-region-as-kill** 5Z$S **delete-region** $rMxMQ$7$F$$$k!# **copyo-region-as-kill** KD$$$F$O$3 $N8e$N%;%/%7%g%sGb@bL@9k$,!"%j!<%8%g%s$r kill-ring $K%3%T!<$7$F%d%s%/=PMh$kh&K9kbNG$ (Section 8.5, “**copy-region-as-kill**”, p. 71, ;2>H!#)

delete-region 4X?t$O!"%j!<%8%g%s$NCf?H$r>C5n$7F7$^$&bN$G!"$3$N>l9g!"$=lr<hjLa9$3$H$O= $J$$!#

3l$^$G$K5DO@$7F-$?%3!<%I$H$OO[$J$j!" **delete-region** $O Emacs Lisp GO=q$+lF$$$J$$!#3l$ C $G=q$+lF$*$j!" GNU Emacs system $N%W%j%_%F%#%V$N0lDG$"$k!#3l$OBgJQC1=c$JbNJN$G!"$A$ HN4V Lisp $+$iC&@~7F!"3lKD$$$F@bL@9k3HK7h&!#

B>$NB?$/$N Emacs $N%W%j%_%F%#%V$HF1MM!" **delete-region** $b C $N%^%/%m$N%$%s%9%?%s%9!"$D$^$j%3!<% $N%F%s%W%l!<%H$H7F$N%^%/%m$H7F=q$+$l$F$$$k!#3N%^%/%m$N:G=i$NItJ,$O<!$Nh&G"$k!#

```
DEFUN ("delete-region", Fdelete_region, Sdelete_region, 2, 2, "r",
  "Delete the text between point and mark.\n\
When called from a program, expects two arguments,\n\
character numbers specifying the stretch to be deleted.")
```

%^%/%m$N5-=R$N:Y$+$$E@$KN)$AF~k3HO7J$$$,!"3N%^%/%m$, DEFUN $H$$$&C18l$+$i;O$^$C$F$$$k$;XE&7F$*$/!#$3$3$G DEFUN $H$$$&C18l$rA*$s$@$N$O!"$3$N%3!<%I$, Lisp K*1k **defun** $HF1$8L\E*$r; $F$$$k$?$aG"$k!#C18l DEFUN $N8e$KB3$/3g8L$NCf$K 7 DNItJ,$,$"$k!#

- :G=i$NItJ,$O!"3N4X?t$K Lisp NCfGM?$($ilk4X?t$NL>A0G"$k!#3N>l9g$O **delete-region** $G $k!#
- FsHVL\$O!"3N4X?t$N C GNL>A0 **Fdelete_region** G"$k!#JX59>e!" ‘F’ $+$i;O$^$C$F$$$k!# C GOL A0$K%O%$%U%s$r;H$o$J$$$N$G!"Be$ojK2<@~ (underscore) $,;H$olF$$$k!#
- ;0HVL\$O!"FbItG3$N4X?t$N>pJs$r5-O?$7F*$/$?aN C $N constant $J9=B$BN$NL>A0$G$"$k!#3l$O GN4X?tL>G"k,!" ‘F’ GOJ/ ‘S’ $G;O$^CF$$$k!#
- ;MHVL\$H8^HVL\$O!"3N4X?t$,0z?t$H7F<hlk:G>.$N?t$H:GBg$N?t$r;XDj7F$$$k!#:#$N>l9g$OAg DN0z?t$r<h$k!#
- O;HVL\$O Lisp $N4X?tDj5A$N%$%s%?%i%/%F%#%V@k8@$KB3$/0z?t$HF1$8$h$&$JbNG"$k!#J8;z$H!"BgDq$ $KB3$/%W%m%s%W%H$,=q$+lk!#:#$N>l9g!"$=$NJ8;z$O "r" G"$k!#$3lO!"3N4X?t$N0z?t$,$=$N%P% $N%j!<%8%g%s$N:G=i$H:G8e$N0LCVG"k3Hr<(7F$$$k!#3N>l9g$O%W%m%s%W%H$O$J$$!#
- <7HVL\$O!"@bL@J8;zNsG"$k!#$3lb Emacs Lisp $N4X?tDj5A$N>l9gH[$\F1$8G"k,!"A4FN2~9T <(E*$K ‘\n’ $KB3$$$F%P%C%/%9%i%C%7%e$HI|5"%3!<%I$r=q$/$3HG<(5l$F$$$k!#

<!$K7A<0E*$J$=$N%*%V%8%'%/%H$N<oN`$N@k8@$H0l=o$K%Q%i%a!<%?$,Mh$F!"$=$7$F!"$3$N%^%/%m$NK\BNItJ, lkItJ,$,Mh$k!# **delete-region** $N>l9g$O!"K\BN$O<!$N;09T$+$iJk!#

```
validate_region (&b, &e);
del_range (XINT (b), XINT (e));
return Qnil;
```

:G=i$N4X?t **validate_region** $O!"%j!<%8%g%s$N;O$^$j$H=*$ojH7FEO5l$?CM$,@5$7$$$7?$G!"E,@Z$JH $+$I$&$+$r%A%'%C%/$7$F$$$k!#FsHVL\$N4X?t!" **del_range** $O!"<B:]$K%F%-%9%H$r:o=|$9$k4X?t$G$"$k!#b 4X?t$,%(%i!<$r5/$3$5$:;E;v$r=*$($?$i!";09TL\$,$=$N3H$r<($9$?$a$K **Qnil** rJV9!#

del_range $OJ#;($J4X?tJN$G!"N)$AF~iJ$$$3HK9k!#3l$O%P%C%U%!$r99?7$9$kJI$NF/$-r9$ $+$7J,$i!" **del_range** KEO5lkFsDN0z?tKOCmL\$7F*$$$?J}$,$$$$$@m&!#XINT(b) $HXINT(e) $ FsDG$"$k!# C 8@8l$K4X$9$k8B$j!" b $H e $O:o=|$9$k%j!<%8%g%s$N;O$^$j$H=*$ojrI=o9FsDN 32 %S% @0?tG"$k!#

8.4 defvar $rMQ$$$?JQ?t$N=i4|2=

delete-region 4X?t$H0c$C$F!" **copy-region-as-kill** 4X?t$O Emacs Lisp $G=q$+lF$$$k!#3l$O %P%C%U%!$N%j!<%8%g%s$rJ#<L$7$F **kill-ring** $H8F$PlkJQ?t$KJ]B8$9kbNG$"$k!#3N%;%/%7%g%sGO JQ?t$,$INh$&$K7F@8@.5l=i4|2=5lkN$+$r@bL@9k!#

($3$3Gb!" **kill-ring** $H$$$&8@MU$O8mMQ$H8@$($k$@$m$&!#%P%C%U%!$+$i@Z$j<hil$?%F%-%9%H$O<h$jLa H,=PMhkNG"$k!#$3lO!";`BNNNXJs+GOJ/!"I|3h=PMh$k%F%-%9%H$NNXJN$@!#)

Emacs Lisp GO!" **kill-ring** Nh$&$JJQ?t$O **defvar** $H$$$&FC<l7A<0KhCF@8@.5l!"=i4|CM$rM?$($ lk!#3NL>A0$O "define variable" $+$iMh$F$$$k!#

defvar $H$$$&FC<l7A<0$O!"JQ?t$KCM$r@_Dj$9$kE@$G **setq**$H;w$F$$$k!# **setq** $H0c$&E@OFsD$"$k!#0l L\$O!"$=$NJQ?t$,$^$@CM$r;}CF$$$J$$>l9gKN$_CM$r@_Dj9k$H$$$&3HG"$k!#4{$KCM$,$"$k>l9g **defvar** O=NCMr>e=q$-$7$?$jO7$J$$!#Fs$DL\$O **defvar** KO@bL@J8;zNs$,$"kH$$$&3HG"$k!#

8=:_$NJQ?t$NCM$O!"$IsJCMG"$l!" **describe-variable** 4X?t$r;H$C$F8+$k3H$,=PMh$k!#3l$OIaDI **C-h v** $r%?%$%W9k3H$G8F$S=P$;$k!# **C-h v** $H%?%$%W7F!"%W%m%s%W%H$,=P$?=j$G **kill-ring** ($H2~9T) F~NO9k$H!"8=:_$N kill %j%s%0$NCf?H$,I$&$JCF$$$k$+8+$k3H$,=PMh$k!#3l$O!"LGCc6lCcB?$$$3Hb 5U$K!"$b$7:#2s Emacs $r5/F0$7F+i3$NJ8=q$rFI$`$@1GB>KO2?b7$F$$$J1l$P!"Cf$K$O2?$bJ $@!#

$^$?!" '***Help***' %P%C%U%!$N:G8e$K **kill-ring** $N@bL@$,J5lF$$$k3H$b8+$FHl$k!#

```
Documentation:
List of killed text sequences.
```

3N kill %j%s%0$O **defvar** $r;H$C$F<!$Nh&$KDj5A$5lF$$$k!#

```
(defvar kill-ring nil
  "List of killed text sequences.")
```

3NJQ?tDj5ANCfG$O!"$3$NJQ?t$O=i4|CM **nil** $rM?$(il$F$$$k!#3lObCHbJ3HG"$k!#2?$b%; $J$$$&A+$i!"%d%s%/ (yank) %3%^%s%I$G2?$+$r<h$j=P7?$$$H$O;W$o$J$$$$@m&!#@bL@J8;zNs$O **defun** $N J8;zNs$HF1$8$h$&$K=q$+$l$F$$$k!# **defun** NbNHF1MM!":G=i$N9T$O$=$l$@$1$G40A4$JJ8KJCF$$$kY 2?8NJi **apropos** Nh$&$J4vD+$N%3%^%s%I$O!":G=i$N0l9T$7$+I=<($7$J$$$+iG$"$k!#$^$?!"$=$N8e$KE $O%$%s%G%s%H9Y$-$GOJ$$!#$=$&7J$$$H **C-h v** (**describe-variable**) $r;H$C$F8+$?>l9g$K8+1I$($,$h$ $J$$!#

BgDq$NJQ?t$O Emacs $NFbIt$NbNG"$k!#$,!"4vD+ **edit-options** %3%^%s%I$r;H$C$F4JC1$K@_Dj=PMh h&KJCF$$$kbNb"$k!# ($?$@$7!"$3$3GN@_DjO=$N;~$N%;%C%7%g%s8BjNbNG"$k!#$=$N@_D E*$K;HMQ7?$$>l9g$O!" '**.emacs**' %U%!%$%k$r;H$&!#>\$7$/$O Chapter 16, "Your '**.emacs**' File", p. 141, $r ;2>H$N3H!#)

4JC1$K@_Dj=PMh$kJQ?t$O!" Emacs NCfG!"@bL@J8;zNs$N0l7eL\$K%"%9%?%j%9%/ '*****' rIU1k3HGB>$NJQ 6hJL$5lF$$$k!#

Nc$($P!"

```
(defvar line-number-mode nil
  "*Non-nil means display line number in mode line.")
```

3l$O **edit-options** %3%^%s%I$r;H$C$F **line-number-mode** NCMrJQ2=5;k3H,=PMhk3Hr<(7F$$ $k!#

L^O@!" **setq** <0$r;H$C$F **line-number-mode** NCMrJQ2=5;k3Hb=PMh$k!#Nc$($P<!$Nh&K9lP$ $$!#

```
(setq line-number-mode t)
```

Section 1.9.2, "Using **setq**", p. 12, ;2>H!#

8.5 copy-region-as-kill

copy-region-as-kill 4X?t$O%P%C%U%!$+$i%j!<%8%g%s$N%F%-%9%H$rJ#<L$7$F!" **kill-ring** $H8F$PlkJQ
?tNCfKJ]B8$9$k!#

b7!" **kill-region** %3%^%s%I$rA02s$N **kill-region** %3%^%s%I$ND>8e$K8F$S=P$7$?$H9k$H!" Emacs $O
?7$7$/J#<L7?%F%-%9%H$r0JA0J#<L$7$?%F%-%9%H$KIU2C (append) 9k!#3l$O!"$b7=$N%F%-%9%H$r%d%
$?>l9g!"0JA0J#<L$7$?J,$H:#2sJ#<L7?J,$r9g$o$;$?A4BNrLa9$3$HKJkH$$$&3H$r0UL#$9$k!#0lJ
copy-region-as-kill $K@hN)$C$FB>$N%3%^%s%I$r;HMQ$7$?>l9g$K$O!"J#<L$7$?%F%-%9%H$O kill %j%s%0$N?7
$$JL$NItJ,$K!"$=$l$^$G$KJ#<L$7$?$bNH6hJL5l$FJ]B8$5lk!#

0J2<$, version 18 GN **copy-region-as-kill** $N40A4$JDj5AG"$k!#$?$@$7!"8+d9$$$h$&$K4vD+$N%3
%a%s%H$r2C$($F@07A$7F"$k!#

```
(defun copy-region-as-kill (beg end)
  "Save the region as if killed, but don't kill it."
  (interactive "r")

  (if (eq last-command 'kill-region)


      ;; then-part: ?7$7$/%3%T!<$5$l$?%F%-%9%H$r
      ;;   A02s%3%T!<$5$l$?$b$N$H7k9g
      (kill-append (buffer-substring beg end) (< end beg))

    ;; else-part: ?7$7$/%3%T!<$5$l$?%F%-%9%H$r?7$?$JMWAG$H$7$F
    ;;   kill %j%s%0$KDI2C$7!"I,MW$J$i kill %j%s%0$rC;$/$9$k!#
    (setq kill-ring
          (cons (buffer-substring beg end) kill-ring))
    (if (> (length kill-ring) kill-ring-max)
        (setcdr (nthcdr (1- kill-ring-max) kill-ring) nil)))

  (setq this-command 'kill-region)
  (setq kill-ring-yank-pointer kill-ring))
```

3l$^$GF1MM!"3N4X?tb^H^jN$"$k4vD+$NItJ,$KJ,1k3H$,=PMh$k!#

```
(defun copy-region-as-kill (argument-list)
  "documentation..."
  (interactive "r")
  body...)
```

0z?t$O **beg** $H **end** G"$j!" **"r"** KhCF%$%s%?%i%/%F%#%V@k8@$,J5lF$$$k!#D^$j!"Fs$D$N0z?t$O
%j!<%8%g%s$N;O$^jH=*oj$r<($9bNG"$k!#$b$7$3$NJ8=q$r$-$AsH:G=i$+$iFIsG$-$?Ji!"3NI
2r9kNOKX$I%k!<%F%#!<%s%o!<%/$K9.$J$$$@m&!#

3N4X?t$NK\BN$O!" **if** <0$G;O$^CF$$$k!#3N<0GdCF$$$kNOFsDN>u67$r6hJL$9k3HG$"$k!
$j!"$3$N%3%^%s%I$, **kill-region** %3%^%s%I$,8F$S=P5l$?D>8e$K<B9T5l$?$+I&$+$NH=CGG"$k!#$b$7
$K<B9T$5l?Ji!"?7$7$/J#<L5l$k%j!<%8%g%s$O0JA0J#<L5l$?ItJ,$KIU2C5l$k!#$=$&$G$J$$$>l9g$O!"
%s%0$N@hF,$K!"0JA0J#<L5l$?$bNH$O6hJL$5lFJ]B8$5$l$k!#

3N4X?tDj5A$N:G8e$NFs9T$O!"Fs$D$N **setq** <0$G$"$k!#0lDOJQ?t **this-command** $r **kill-region** $K!"$b
$&0l$D$OJQ?t **kill-ring-yank-poiter** $r kill %j%s%0$K@_Dj9k!#

3N **copy-region-as-kill** $NK\BN$,$O>\$7$/8+$k2ACM$,$"$k!#

8.5.1 copy-region-as-kill $NK\BNItJ,

copy-region-as-kill 4X?t$O!"Fs9T0J>e$N kill $r0l$D$N9`L\$KDJ2kh&$K=q$+lF$$$k!#b7!"$=$
ir kill %j%s%0$+$i%d%s%/7F<h$j=P$9$H!"0l2U=j$K$^$HaF<h$j=P$5lk!#99$K!"8=:_$N%+!<%=%k$N0LCV

J} (D^$j%F%-%9%H$N=*oj$NJ}) $K8~$+CF **kill** 9k$H!"$=$NItJ,$O0JA0 **kill** 7?%F%-%9%H$N8e$KIU$12C
$1!"8eJ} ($D$^$j%F%-%9%H$N;O$^jNJ}) $K8~$+CF **kill** 9k$H!"0JA0 **kill** 7?%F%-%9%H$NA0$KIU$12C$(i
3&7F%F%-%9%H$NItJ,$O@5$7$$=g=x$KJ]$?lk3HKJ$k!#

3N4X?t$O!"8=:_!"5Z$S$=$N0l$DA0$K Emacs $,<B9T$7$?%3%^%s%I$r21$($F$*$/$?$aKFsD$NJQ?t **th**
command $H **last-command** $r;H$C$F$$$k!#

DL>o!" Emacs OIsJ4X?t$r<B9T$7$F$$$k>l9gGb **this-command** NCMr8=:_<B9TCf$N%3%^%s%I$NCM (:#
>l9gJi **copy-region-as-kill**) $K%;%C%H$7$F$$$k!#7+7J$,$i!" **copy-region-as-kill** $N>l9g$O0c
$&!#$3$N4X?t$O **this-command** NCMr **kill-region** $K%;%C%H$9$k!#$3lO **copyo-region-as-kill** $r8F
$S=P$7$F$$$k4X?t$NL>A0$G$"$k!#

copy-region-as-kill $NK\BNItJ,$N:G=i$N%Q!<%H$G$O!" **if** <0$G **last-command** $, **kill-region** $+$I
$&$+$rH=Dj$7$F$$$k!#b7$=$&G"lP!" **kill-append** 4X?t$r;H$C$F:#2sJ#<L$7$?%F%-%9%H$r **kill** %j%s%0$
=i$NMWAG ($D$^$j CAR) $N%F%-%9%H$H7k9g9k!#0lJ}!"b7$b **last-command** NCM, **kill-region** $GL5$1$1
$P **copy-region-as-kill** 4X?t$O **kill** %j%s%0$K?7$7$$MWAGrIU12C$($k3HKJ$k!#

if <0$O<!$NDLjG$"$k!#3l$O **eq** $r;H$C$F$$$k$,!"$3$N4X?t$O$3$3$G=i$a$F=P$F$-$?bNG"$k!#

```
(if (eq last-command 'kill-region)
    ;; then-part
    (kill-append (buffer-substring beg end) (< end beg))
```

eq 4X?t$O!":G=i$N0z?t$,FsHVL\$N0z?t$HF1$8 Lisp %*%V%8%'%/%H$+$I$&$+$rH=Dj$9kbNG$"$k!# **eq** 4X
equal 4X?t$H!"Ey$7$$$+I&$+$NH=Djr9kH$$$&E@GO;w$F$$$k$,!"0[$J$kL>A0$r;}DbN,!"7W;;5!$
$G<B:]$KF1$8%*%V%8%'%/%H$+I&$+$rH=Dj9kN+$=$&GJ$$$+!"$H$$$&E@$G0[$JCF$$$k!# **eq** $NJ}$OF1
%8%'%/%H$N>l9g$G$J$$$H??rJV5$J$$$,!" **equal** 4X?t$NJ}$OFsDN<0$,F1$89=B$$G$"$j$+$DF1$8FbMF$G$"$
9l$P??$rJV$9!#

(LuCp!'$3$3OAgC$HJ,$jFq$$$+b7lJ$$!#>\$7$/$O Section "Equalty Pradicates" in *The GNU Emacs Lisp Reference Manual*, $r;2>H!#$J$*!" Chapter 9, "%j%9%H$OINh&$K<BAu$5lF$$$k$+", p. 77, $b;29M
KJ$k!#)

4X?t kill-append

kill-append 4X?t$O<!$Nh&JbNG$"$k!#

```
(defun kill-append (string before-p)
  (setcar kill-ring
          (if before-p
              (concat string (car kill-ring))
              (concat (car kill-ring) string))))
```

3N4X?t$r%Q!<%H$4HK8+$F$$$3$&!# **setcar** 4X?t$O **concat** $r;H$C$F?7$7$$%F%-%9%H$r **kill** %j%s%0$N CA
$H7k9g$7$F$$$k!#?7$7$$J}$N%F%-%9%H$rA0$K;}$CF/k+!"8e$K;}$CF/k+$O **if** <0$N7k2LKh$k!#

```
(if before-p                            ; if-part
    (concat string (car kill-ring))     ; then-part
  (concat (car kill-ring) string))      ; else-part
```

b7!":#2s@Z$j<h$C$?%j!<%8%g%s$,D>A0$N%3%^%s%I$G@Z$j<h$C$?%F%-%9%H$hjbA0K"lP!":#2s@Z$j<h$
$O0JA0J]B8$7$?$bNNA0KDJ2kY$-$G$"$k$7!"5U$K!":#2s@Z$j<h$C$?%F%-%9%H$,0JA0@Z$j<h$C$?%F%-%
$KB3$/bNJi!"0JA0J]B8$7$?bN$N8e$KDJ2kY-G"$k!# **if** <0$O:#2sJ]B8$9$k%F%-%9%H$r0JA0J]B8
$$$?%F%-%9%H$NA0$KD1k+8eKD1k$+$r **before-p** $H$$$&=R8l$GH=CG$7$F$$$k!#

%7%s%\%k **before-p** $O **kill-append** $N0z?t$NL>A0$N0l$DG"$k!# **kill-append** 4X?t$,I>2A5lkH!"$3
lO<B:]$N0z?t$rI>2A7FJV5l$?CM$K%P%$%s%I$5lk!#:#$N>l9g$G$"$l$P!" (< end beg) NCM,%P%$%s%
$k!#$3$N#S<0$O!":#2s$N%3%^%s%I$G@Z$j<h$il?%F%-%9%H$,D>A0$N%3%^%s%I$G@Z$j<hil$?%F%-%9%H$NA0$
$$$k$+!"$=lH$b8e$KB0$7$F$$$k$+$r!"D>@\H=Dj7F$$$ko1GO$J$$!#3N<0$,$dCF$$$kNOJQ?t **en**

$,JQ?t **beg** NCMhjb>.$5$$$+I&$+$NH=Dj$@$1G"$k!#$b$7>.$5$1$l$P!"$=lO%f!<%6$,$*$=$i$/$O%P
$N@hF,$K8~$+$C$F$$$k$H$$$&3H$r0UL#$9$k!#$H$$$&o1$G!"$3$N>l9g$O0JA0$N%F%-%9%H$NA0$K:#2s$N%F%
DI2C9kh&KJCF$$$k!#0lJ}!"b7 **end** NCMNJ}$, **beg** NCMhjbBg$-$+C?>l9g!":#2s$N%F%-%9%H$
$N%F%-%9%H$N8eHx$KDI2C$5lk!#

?7$7$/J]B8$7$?%F%-%9%H$,0JA0J]B8$7$?%F%-%9%H$NA0$KDI2C$5lk>l9g$O!"$=$N?7$7$$%F%-%9%H$rA0$K$
%F%-%9%H$H7k9g$5lk!#

```
(concat string (car kill-ring))
```

5U$K!"%F%-%9%H$,8e$KDI2C$5lk>l9g$O!"?7$7$$%F%-%9%H$r8E$$%F%-%9%H$N8e$K7F7k9g9k!#

```
(concat (car kill-ring) string))
```

3N4X?t$NF0:n$rM}2r9k$?$aKO!" **concat** 4X?t$NI|=,$+$i;O$aJ1lPJi$J$$$@m&!# **concat** 4X
FsDN%F%-%9%HJ8;zNs$r0l$DKDJ2kbNG$"$k!#7k2L$bJ8;zNs$KJk!#Nc$($P<!Nh$&$J46$8$G$"$k!

```
(concat "abc" "def")
     ⇒ "abcdef"

(concat "new "
        (car '("first element" "second element")))
     ⇒ "new first element"

(concat (car
        '("first element" "second element")) " modified")
     ⇒ "first element modified"
```

0J>e$G **kill-append** 4X?t$,M}2r=PMhkh$&$KJk!#3l$O!" kill %j%s%0$NCf?H$r=$@5$9$kbNG"$k!#
%j%s%0$O%j%9%H$G$"$j!"3F!9$NMWAG$OJ]B8$5$l$?%F%-%9%H$G$"$k!# **setcar** 4X?t$,<B:]$K3N%j%9%H$N:G=i$
rCV-49$($kLrL\$r2L$?$7$F$$$k!#$=$N$?$a$K!"$^$: **concat** $G kill %j%s%0$N:G=i$NMWAG (kill %j%s%0$N CA
$H?7$7$$%F%-%9%H$r7k9g$7!"85$NMWAG$r$=$N?7$7$/=PMh$?MWAG$GCV-49($F$$$k!#?7$7$/J]B8$9$k%F%-%9%
$N%F%-%9%H$NA0$K7k9g$9k+8e$K7k9g$9k+$O!"$=l,8E$$%F%-%9%H$r@Z$j<hC?>l=j$NA0$K$"$k$+8e$K$
hk!#7k9g5l$?7k2L$, kill %j%s%0$N?7$7$$:G=i$NMWAG$HJk!#

$D$$$GJ,$i!";d$N8=:_$N kill %j%s%0$N:G=i$NJ}$r5s2F$*$3$&!#

```
("concatenating together" "saved text" "element" ...
```

copy-region-as-kill $N **else-part**

5F!" **copy-region-as-kill** $N@bL@$KLam&!#

b7D>A0$N%3%^%s%I$, **kill-region** GJ$+$C$?$H9k$H!"$3$N>l9g$O **kill-append** GOJ/!"<!$N#S<0
else-part $,8F$Plk3HKJ$k!#

```
(if true-or-false-test
    what-is-done-if-test-returns-true
  ;; else-part
  (setq kill-ring
        (cons (buffer-substring beg end) kill-ring))
  (if (> (length kill-ring) kill-ring-max)
      (setcdr (nthcdr (1- kill-ring-max) kill-ring) nil)))
```

else-part $N **setq** $N9T$G$O!" kill %j%s%0$N?7$7$$CMH7$F!"8E$$ kill %j%s%0NCMK?7$7$/:o=|7?J8;zNs
2C$($?7k2L$r%;%C%H$7$F$$$k!#

3l$,$I$&$$$&3HrdCF$$$k$+$r4JC1JNcG8+F_k3HK7h$&!#

```
(setq example-list '("here is a clause" "another clause"))
```

3N#S<0$r C-x C-e $GI>2A$9kH!" example-list $,I>2A=PMh$kh&KJ$k!#$=$N7k2L$O<!NDLj!#

```
example-list
     ⇒ ("here is a clause" "another clause")
```

5F!"<!$N#S<0$rI>2A9k3H$G!"$3$N%j%9%H$K?7$7$$MWAGrIU12C$($F$_$h$&!#

```
(setq example-list (cons "a third clause" example-list))
```

3l$rI>2A$9kH!"<!NCM,JV5lkN$,J,$k!#

```
example-list
     ⇒ ("a third clause" "here is a clause" "another clause")
```

$+$/7F!";0HVL\$NMWAG$, cons KhCF%j%9%H$K2C$(il$?!#

3N4X?tGN setq $d cons $b>e$HF1$8$3HrdC$F$$$kNG$"$k!#0c$&$N$O!"%j!<%8%g%s$N%F%-%9%H$r<h
7F cons KEO9$?$a$K!" buffer-substring $r;H$C$F$$$k3HG"$k!#$=$N9T$rb&0lEYH4$-=P$7F*$/

```
(setq kill-ring (cons (buffer-substring beg end) kill-ring))
```

copy-region-as-kill $N else-part $N<!$NItJ,$O!"$b$&0l$D$N if <0$G$"$k!#3N if <0$O kill %j%s%0$,D9
$/$Jj9$.$kNrKI0bNG$"$k!#3NItJ,$O0J2<$Nh&KJCF$$$k!#

```
(if (> (length kill-ring) kill-ring-max)
    (setcdr (nthcdr (1- kill-ring-max) kill-ring) nil)))
```

3N%3!<%IO^$: kill %j%s%0$ND9$5$,:GBg5vMFHO0OKr1[$($F$$$J$$$+I&$+%A%'%C%/$7$F$$$k!#:GBg5
0OHO kill-ring-max $NCM (%G%U%)%k%H$G$O 30) N3HG$"$k!#b7$3$ND9$5$,$=$lhjD9$1lP!"3N%
%I$O kill %j%s%0$N:G8e$NMWAG$r nil $K%;%C%H$9$k!#$=N?aKFsDN4X?t nthcdr $H setcdr $rMxMQ$7$F
$k!#

@h$K setcdr $NJ}$r8+k3HK9k!# (Section 7.5, “setcdr”, p. 61, ;2>H!#) 3l$O%j%9%H$N CDR $r@_Dj
9kbNG"$k!# setcar $,%j%9%H$N CAR $r@_Dj$9kN$HF1MM$@!#7+7J$,$i!"3N>l9g setcdr $O kill
%s%0A4BN$N cdr $r@_Dj$9kNGO$J$$!#

nthcdr 4X?t$O7+$jJV$7%j%9%H$N CDR $r<h$k3H$GF0:n$9$k!#$D$^$j!" CDR $N CDR $r<h$j!"$=$N$^$? CD
$r<h$j ... $H$$$&A`:n$r N 2s7+$jJV7F!"$=$NCMrJV9NG$"$k!#

b7;MDNMWAG$N%j%9%H$,$"$C$F!"$=lr (:G=i$N) ;0$D$NMWAG$N%j%9%HK7$?$$>l9g!"Fs2s CDR $r<h$
Mh$?%j%9%H$N CDR $r nil $K@_Dj$9lP$h$$!#3Nh&K7$F!"%j%9%H$rC;$/=PMh$kNG$"$k!#

0J>eN3HO!"2<$N;0$D$N#S<0$r=g$KI>2A$7$F$$$/3H$GM}2r=PMh$k!#$^$:$O trees NCMr (maple o
pine birch) $K%;%C%H$7!"<!K=$NFsHVL\$N CDR $N CDR $r nil $K%;%C%H$9$k!#$=7F trees NCMr8+
F_kNG"$k!#

```
(setq trees '(maple oak pine birch))
     ⇒ (maple oak pine birch)

(setcdr (nthcdr 2 trees) nil)
     ⇒ nil

trees
     ⇒ (maple oak pine)
```

(setcdr <0$=$NbNNCMO nil KJ$k!#$3lO!" CDR $r nil $K%;%C%H$7$?$+iG$"$k!#)

7+jJV7N?aK nthcdr 4X?t$r;H$C$F!" copy-region-as-kill$KBP$7 kill %j%s%0$N:GBg5vMFHO0Ohj$b
1 >/$J$$2s?t$@$1 CDR $r<h$j!":G8eKJV5l? CDR $NCM ($3lO kill %j%s%0$N:G8e$NMWAGG"$k) $r nil
%;%C%H9k!#3&7F kill %j%s%0$,D9$/Jj2a$.$k3H$rKI$$$G$$$kNG$"$k!#

copy-region-as-kill 4X?t$N<!$N9T$O

```
(setq this-command 'kill-region)
```

G"$k!#$3$N9T$OFbB&$N#S<0$K$b30B&$N **if** <0KbB0$7$F$$$J$$!#=>CF!" **copy-region-as-kill** $,8F$P$l
$?$S$KKh2sI>2A$5lk!#$3$3$NItJ,$G **this-command** $, **kill-region** $K@_Dj$5lF$$$k3H$,J,$k$@$m$&
A0$K8+$?h&$K!"<!$N%3%^%s%I$,M?$(ilkH!"3NCM$O **last-command** NCMKJk!#

:G8e$K **copy-region-as-kill** $N:G8e$N9T$r8+$F$_$h$&!#

```
(setq kill-ring-yank-pointer kill-ring)
```

kill-ring-yank-pointer $O **kill-ring** $K@_Dj$5lk%0%m!<%P%kJQ?tG"$k!#

kill-ring-yank-pointer $O%]%$%s%? (‘**pointer**’) HO8FPl$F$$$k1lIb!"<B:]$O kill-ring $HF1$8
h&$JJQ?t$G$"$k!#$?$@$7!"$3Nh$&$JL>A0$,$D$$$F$$$kNO!"3NJQ?t$N;H$o$lJ}$,h/J,kh$&$K9
$"$k!#3NJQ?t$O **yank** $d **yank-pop** JI$N4X?t$G;HMQ5l$k!# (Chapter 10, “%F%-%9%H$N%d%s%/”, p. 81, ;2
>H!#)

3NJUjNOCr9kKOdOj!"%P%C%U%!$+$i@Z$j<h$C$?%F%-%9%H$r<hjLa9$?$a$N%3%^%s%I — %d%s%/
%IKD$$$FOC5J1lPJk^$$!#$,!"$=NOCr9kA0$K!"%j%9%H$,7W;;5!$NFbIt$GINh&$K07$olk$
7F$*$$$?J}$,NI$$$@m&!#$=$&9k3H$G!"!V%]%$%s%?!W$H$$$C$?%_%9%F%j%"%9$J8@MU$rL@3N$KM}2r=PM
KJk@m&!#

8.6 I|=,

3NJUjGF3F~7?4X?tKD$$$F$N4JC1$J$^$Har:\$;F*$/!#

car
cdr   **car** $O%j%9%H$N:G=i$NMWAG$rJV$9!# **cdr** $O%j%9%H$NFsHVL\0J9_$NMWAG$+iJ$k%j%9%H$rJV$9!#

Nc!K

```
(car '(1 2 3 4 5 6 7))
     ⇒ 1
(cdr '(1 2 3 4 5 6 7))
     ⇒ (2 3 4 5 6 7)
```

cons   **cons** $O:G=i$N0z?t$rFsHVL\$N0z?t$NA0$K2C$($k3H$G?7$?$J%j%9%H$r:n@.9k!#

Nc!K

```
(cons 1 '(2 3 4))
     ⇒ (1 2 3 4)
```

nthcdr   %j%9%HKBP7$F ‘n’ 2s **cdr** $r<h$C$?7k2L$rJV$9!#8@$o$P ‘;D$j’ $N ‘;D$j’ G"$k!#

Nc!K

```
(nthcdr 3 '(1 2 3 4 5 6 7))
     ⇒ (4 5 6 7)
```

setcar
setcdr   **setcar** $O%j%9%H$N:G=i$NMWAG$rCV-49($k!# **setcdr** $O%j%9%H$NFsHVL\0J9_$NMWAG$rCV-49
$k!#

Nc!K

```
(setq triple '(1 2 3))

(setcar triple '37)

triple
     ⇒ (37 2 3)

(setcdr triple '("foo" "bar"))

triple
     ⇒ (37 "foo" "bar")
```

progn 0z?t$r=g$KI>2A7F$$$-!":G8eNCMrJV$9!#

Nc!K

```
(progn 1 2 3 4)
     ⇒ 4
```

save-restriction
%+%l%s%H%P%C%U%!$N%J%m!<%$%s%0$N>pJs$rIs$J>uBV$G$"$lJ]B8$7!"0z?t$rI>2A$7=*$C$?8e!"$
BV$rI|85$9$k!#

search-forward
J8;zNs$r8!:w$7!"b7J8;zNs$,8+$D$+$l$P!"$=3K%]%$%s%H$r0\F0$9$k!#

0z?t$O<!$N;M$D

1. 8!:wJ8;zNs
2. >JN,2DG=!#8!:wHO0O!#
3. >JN,2DG=!#8!:w$K<:GT$7$?;~$K **nil** rJV9$+%(%i!<%a%C%;!<%8$r=P9+$r;XDj!#
4. >JN,2DG=!#8!:w$r2?2s<B9T$9k+$r;XDj!#Ii?t$N>l9g$O8eJ}8!:w$KJk!#

kill-region

delete-region

copy-region-as-kill
kill-region $O%P%C%U%!$N%]%$%s%H$H%^!<%/$N4V$N%F%-%9%H$r@Z$j<hCF$=$l$r kill %j%s%0$KJ
B8$9$k!#3N%F%-%9%H$O%d%s%/$KhC$F<h$j=P$9$3H,=PMh$k!#

delete-region $O%]%$%s%H$H%^!<%/$N4V$N%F%-%9%H$r%P%C%U%!$+$i:o=|7F<NFF7^$&!#I|
5;k3HO=PMh$J$$!#

copy-region-as-kill $O%]%$%s%H$H%^!<%/$N4V$N%F%-%9%H$r kill %j%s%0$KJ#<L$9$k!#$3lO%d
%s%/KhCF<h$j=P$9$3$H$,=PMh$k!#3N4X?t$O%P%C%U%!$+$i%F%-%9%H$r@Z$j<h$C$?$j:o=|7
7J$$!#

8.7 8!:wKD$$$F$NN}=,LdBj

- J8;zNs$r8!:w$9$k%$%s%?%i%/%F%#%V$J4X?t$r=q$-$J$5$$!#b7J8;zNs$N8!:w$K@.8y9lP=$ND>8e$K
%H$r0\F0$7!"!V8+D1$?!*!W$H$$$&%a%C%;!<%8$rI=<($9kh$&$K7J$5$$!#(3N4X?t$NL>A0$K **sea**
forward $H$$$&L>A0$r;H$CFO$$$1$J$$!#$=$&7F7^$&$H!"85$N Emacs $GDj5A$5l?8=:_$N **search**
forward $r>e=q$-7F7^$&!#Nc$($P **test-search**$H$$$&L>A0$r;H$$$J$5$$!#
- 8=:_$N kill %j%s%0$N;0HVL\$NFbMF$r%(%3!<NN0h$KI=<(9kh&$J4X?t$r=q$-$J$5$$!#$=$N:]!"b7 kill
%0$K;0HVL\$NMWAG$,L5$$>l9gKbE,@Z$J%a%C%;!<%8$rI=<(9kh&K7J5$$!#
- version 19.29 GO **copy-region-as-kill** ObOd **this-command** KCMr%;%C%H7J$$!#3NJQ99
$G!"$INh$&$J1F6A$,=P$k$+!) $^$?!"2?8N3Nh&$JJQ99$,9Tol$?$H;W$&$+!#

9 %j%9%HOINh$&$K<BAu5l$F$$$k$+

Lisp GO!"%"%H%`$OD>@\E*$JJ}K!$G5-O?$5lk!#$?$H$(8=<B$N<BAuJ}K!$,D>@\E*$GOJ$+$C$?$H7F$b
>e$OD>@\E*$G$"$k!#Nc$($P ‘rose’ $H$$$&%"%H%`$O;M$D$NNY@\$9$kJ8;z ‘r’, ‘o’, ‘s’, ‘e’ H7$F5-O?$5lk
0lJ}!"%j%9%HObCH0[JkJ}K!$G5-O?$5lk!#%a%+%K%:%`H7FOF1$8$/$i$$C1=cJN$@$,!"$=$N%"%$%
47lkNKOAgC$H;~4V$,$+$+k+b7lJ$$!#%j%9%H$O!"%]%$%s%?$N%Z%"$NNsH7$F5-O?$5lk!#3
$G!"3F!9$N%Z%"$N0lHVL\$N%]%$%s%?$O!"$"$k%"%H%`$+!"$b7/$OB>$N%j%9%H$r;X$7$F$$$k!#$=$7$F!"FsHVL
%s%?$O<!$N%Z%"$+!"%7%s%\%k **nil** $r;X$7$F$$$k!# **nil** $N>l9g$O%j%9%H$N=*$ojH$$$&3HG"$k!#

%]%$%s%?$=$l<+?H$O!";X5l$F$$$kBP>]$N6K$a$FC1=c$JEE5$E*$J=;=j$@$H8@$($k!#=>CF!"%j%9%H$b
$J=;=j$NNsH7$F5-O?$5lF$$$k$H8@$($k!#Nc$($P!" **(rose violet buttercup)** $H$$$&%j%9%H$O ‘**rose**’,
‘**violet**’, ‘**buttercup**’ $H$$$&;0DNMWAG$r;}$C$F$$$k!#7W;;5!NCfG$O!"‘**rose**’ $NEE5$E*$J=;=j$O!"$"$k
;;5!$N%a%b%j$N%;%0%a%s%H$K ‘**violet**’ $H$$$&%"%H%`$NEE5$E*$J=;=j$r<($9%"%I%l%9$KJBsG5-5l$F$$$k!
F3CA$N=;=j (‘**violet**’ $N>l=j$r<(9b$N) $O ‘**buttercup**’ $H$$$&%"%H%`$NEE5$E*$J=;=j$r<($9%"%I%l%9$
sG5-5l$F$$$k!#

3Nh&$K=q$/$H2?$d$iJ#;($K;W$($k$+$b7l$J$$$,!"?^$K=q$$$F$_$l$P4JC1$KM}2r=PMhk@m&!#

```
 ___ ___      ___ ___      ___ ___
|___|___|--> |___|___|--> |___|___|--> nil
  |            |            |
  |            |            |
   --> rose     --> violet   --> buttercup
```

>e$N?^$NCf$G!"3F!9$NH"$O Lisp %*%V%8%’%/%H$rJ];}9k7W;;5!$N%a%b%j$N%o!<%I$rI=8=$7$F$$$k!#3l$
$O%a%b%j%"%I%l%9$N7Ar7$F$$$k!#3liNH"!"B($A=;=j$O!"%Z%"KJCF$$$k!#3F!9$NLp0u$O!"$=$N%"%
;}$D=;=j$r;X7F$$$k!#$=$N>l=jKO!"%"%H%`$+B>$N%"%I%l%9$N%Z%"$,$"$k!#:G=i$NH"$O ‘**rose**’ $NEE5$E*$
G"$j!"Lp0u$O ‘**rose**’ $r;X$7$F$$$k!#FsHVL\$NH"$O<!$NH"$N%Z%"$r;X7F$*$j!"3CAN%Z%"$N0lHVL\$
‘**violet**’ $N=;=j!"$=7FFsHVL\$NH"O^$?<!$N%Z%"$N%"%I%l%9!"$H$$$&6q9gKJCF$$$k!#$=$7$F:G8e$NH
%7%s%\%k **nil** $r;X$7$F$$$k!#3l$O!"%j%9%H$N:G8e$r<($7$F$$$k!#

setq JI$N4X?t$KhCF"$kJQ?t$,3N%j%9%H$K%;%C%H$5l?>l9g!"3N%j%9%H$N@hF,$NH"$N%"%I%l%9$
JQ?t$K%;%C%H$5lk!#=>CF!"

```
(setq bouquet '(rose violet buttercup))
```

$H$$$&#S<0$rI>2A$9kH!"0J2<Nh$&$J>u67KJ$k!#

```
bouquet
     |
     |    ___ ___      ___ ___      ___ ___
      --> |___|___|--> |___|___|--> |___|___|--> nil
            |            |            |
            |            |            |
             --> rose     --> violet   --> buttercup
```

3N>l9g!"%7%s%\%k **bouquet** $,:G=i$N%Z%"$N%"%I%l%9$r;}D3HKJk!#<B:]!"%7%s%\%k **bouquet** $O4v$D$
%"%I%l%9%\%C%/%9$+$i=PMh$F$$$k!#0lDOI=<(5l$kC18l$N ‘**bouquet**’ $N=;=j$G$"$j!"Fs$DL\$O3N%7%s%
Dj5A5l$F$$$k4X?t$N%"%I%l%9$G$"$j!";0$DL\$O%j%9%H **(rose violet buttercup)** $H$$$&%j%9%H$N:G=i$N
%I%l%9%\%C%/%9$N%Z%"$N%"%I%l%9G"$j!"$H$$$&U&G"$k!#

F1$8%j%9%H$rAgCHH"$N=q$-J}rJQ($?JL$N%$%i%9%H$GIA$$$F$_$k$H!"<!$Nh&KJ$k!#

```
bouquet
 |
 |    --------------       ---------------       ----------------
 |   | car    | cdr   |     | car     | cdr   |     | car      | cdr  |
  -->| rose   |   o------->| violet |   o------->| butter- |  nil |
     |        |       |     |         |       |     | cup      |      |
      --------------       ---------------       ----------------
```

:G=i$NJ}$N%;%/%7%g%sGO!"%7%s%\%k$r0z$-=P7,4vD+$"$k@0M}C*$@$H8+Jo9HNI$$$H=q$$$?!#4X?tD
$k0z$-=P7KF~CF$*$j!"CM$OB>$N0z$-=P$7$KF~$C$F$$$k!"$H$$$&@bL@$@!#CM$,$"$k0z$-=P$7$NCf?H$OB>$
7NCf?H$K1F6A$rM?$($:KJQ(k3H,=PMhk7!"$=$N5U$b2DG=$@Hb=q$$$?!#<B:]KO!"3F!9$N0z$-=P$
$F$$$kNOCM$d4X?tDj5A$N%"%I%l%9G"$k!#$3lO!"20:,N"It20$G8E$$C*$r8+$D1F!"$=$N0z$-=P$7$N0l$
F_kH!"Ju$,Kd$^CF$$$k>l=j$,IA$+l?CO?^$,8+$D$+$C$?$H$$$&3HKNc(ilh&!#

(L>A0$@$1GOJ/!"%7%s%\%k$NDj5A$dJQ?t$NCM!"$^$?!"$=$NB>$N>pJs$r<h$j=P9?aN B0@-%j%9%H (
erty list) $N!V0z$-=P$7!W$H$$$&bNb"$k!#B0@-%j%9%H$K$D$$$FO3$3$G$O@bL@$O7J$$!# Section "Proper
Lists" in *The GNU Emacs Lisp Reference Manual*, $r;2>H$N3H!#)

<!$O6uA[>e$N@0M}C*$N3($G$"$k!#

```
               Chest of Drawers          Contents of Drawers

             ---------------------
            |                     |
            |    symbol name      |             bouquet
            |                     |
             ---------------------
            |                     |
            |  symbol definition  |             [none]
            |                     |
             ---------------------
            |                     |
            |   variable value    |             (rose violet buttercup)
            |                     |
             ---------------------
            |                     |
            |   property list     |             [not described here]
            |                     |
             ---------------------
            |/                   \|
```

b7!"%7%s%\%k$,$"$k%j%9%H$N CDR $K%;%C%H$5l?Ji!"$=$N%j%9%H<+?H$OJQ2=$7$J$$!#$=$N%7%s%
C1K=$N%j%9%H$N%"%I%l%9$r;}$Dh&KJk@1G$"$k!# (@lLgMQ8lGO!" CAR $d CDR $O!VHsGK2uE* (n
destructive)!W G"kH8@$&!#) =>$C$F!"<!$N#S<0$rI>2A$9kH!"

```
(setq flowers (cdr bouquet))
```

0J2<Nh$&$J>u67$,@8$:$k!#

```
bouquet        flowers
  |              |
  |     ___ ___  |    ___ ___      ___ ___
   --> |   |   |  --> |   |   |    |   |   |
       |___|___|----> |___|___|--> |___|___|--> nil
         |              |            |
         |              |            |
          --> rose       --> violet   --> buttercup
```

flowers NCMO **(violet buttercup)** G"k,!"3l$O%7%s%\%k **flower** $,%"%I%l%9%\%C%/%9$N%Z%"$N
%"%I%l%9$r;}$C$?$H$$$&3HG"$k!#$3$N%Z%"$N:G=i$NH"$K$O **violet** $N%"%I%l%9$,$"$j!"FsHVL\$NH"
butercup $N%"%I%l%9$,F~CF$$$k!#

%"%I%l%9%\%C%/%9$N%Z%"$O%3%s%9%;%k (*cons cell*) b7$/$O%I%C%HBP (*dotted pair*) $H8F$Plk!# Section
“List Type ” in *The GNU Emacs Lisp Reference Manual*, 5Z$S Section “Dotted Pair Notation” in
The GNU Emacs Lisp Reference Manual, $K%3%s%9%;%k$H%I%C%HBPKD$$$FNh$j>\$7$$>pJs$,$"$k!#

4X?t **cons** $O!">e$K=RY?h&$J%"%I%l%9$NNs$N@hF,$K?7$7$$%"%I%l%9%Z%"rIU12C$($k!#Nc$($P!"

```
(setq bouquet (cons 'lily bouquet))
```

$rI>2A$9kH

```
bouquet                     flowers
  |                           |
  |     ___ ___        ___ ___  |     ___ ___       ___ ___
   --> |   |   |      |   |   |  --> |   |   |     |   |   |
       |___|___|----> |___|___|----> |___|___|---->|___|___|--> nil
         |              |              |             |
         |              |              |             |
          --> lily       --> rose       --> violet    --> buttercup
```

$H$$$&>u67KJ$k!#$3$NA`:n$G$O%7%s%\%k **flowers** NCMrJQ99$7$F$$$ko1GO$J$$!#3l$O<!$rI>2A9
$G3N$+ailk!#

```
(eq (cdr (cdr bouquet)) flowers)
```

3l$O!" **t** rJV9O:$@!#:F@_Dj$5lJ$$8B$j!" **flowers** O:CH **(violet buttercup)** $H$$$&CM$r;}$C$
$^$^G"$k!#$D$^$j!":G=i$N%"%I%l%9$, **violet** G"$k%3%s%9%;%k$N%"%I%l%9$r;}$C$F$$$k$H$$$&3H$@!
>e$NA`:n$O!"4{$KB8:_$7$F$$$k%3%s%9%;%krJQ($?$jO7$J$$!#$=$liOA4F=N^$^$G$"$k!#

=>CF!" Lisp $G%j%9%H$N CDR $rF@$kKO!"C1K=NNsNNYjN%3%s%9%;%k$N%"%I%l%9$rF@lPh/!"
CAR $rF@$kKO!"C1K=$N%j%9%H$N:G=i$NMWAG$N%"%I%l%9$rF@$lPh$$!#99$K!"%j%9%H$K?7$7$$MWAG$r **co**
kK$O!"%j%9%H$N@hF,$K?7$7$$%3%s%9%;%k$r2C$(lP$h$$!#0J>e$,$3$NOCBj$K4X9kA4FG$"$k!# Lisp $N
6C$/$[$IL@2r$GC1=cNJN@!#

GO!"%3%s%9%;%kNNsN:G8e$N%"%I%l%9$OI3$K4XO"$E1ilF$$$kN+!) 3l$O **nil**, B($A!"6u%j%9%
$k!#

$^$Hak$H!" Lisp $NJQ?t$K$"$kCM$K%;%C%H$5lk;~$O!"$=$NJQ?t$K$O!"$=$NJQ?t$,8+$K$$$/%j%9%H$N%"
$,M?$(ilkH$$$&o1G"$k!#

9.1 N}=,LdBj

flowers $K **violet** $H **buttercup** $r%;%C%H$7J5$$!#$^$?!"3N%j%9%H$K99$KFsDN2V$r cons $7!"?7$7$/ =PMh$?%j%9%H$r **more-flowers** $K%;%C%H$7J5$$!# **flowers** $N CAR $K5{$NL>A0$r%;%C%H$7J5$$!#3N;~ **more-flowers** $N%j%9%H$NCf?HOI$&$Jk+!#

10 %F%-%9%H$N%d%s%/

GNU Emacs $G 'kill' %3%^%s%I$G%P%C%U%!$+$i%F%-%9%H$r@Z$j<hC?>l9g!"$=$N%F%-%9%H$O>o$K!"%d%s
(yank) %3%^%s%I$G<h$jLa$9$3H,=PMh$k!#%P%C%U%!$+$i@Z$j<hil$?%F%-%9%H$O kill %j%s%0KCV+lF$
%d%s%/%3%^%s%I$O!"$3$N kill %j%s%0$NCf$+$i3:Ev9kFbMF$r<h$j=P7F%P%C%U%!$KA^F~$9$k ($3lO!"85$
%U%!HO8BiJ$$)!#

C1Jk C-y (yank) %3%^%s%I$O!" kill %j%s%0$N:G=i$NMWAG$r%+%l%s%H%P%C%U%!$KA^F~$9$k!#$b$7!" C-y
%^%s%IN9$08e$KB3$1$F M-y $H%?%$%W9k$H!"$=$N:G=i$NMWAG$,FsHVL\$NMWAG$H<h$j49$($ilk!#B3$1$F
M-y $r%?%$%W9k$H!"$=$N2s?t$@$1:G=i$NMWAG$rF~$lBX$($F$$$-!"0l2sj9kH$^$?:G=iKLaCF=lr
$9!# ($=$&$$$&o1$G kill %j%s%0$O!V%j%9%H!WGOJ/!V%j%s%0!W$H8F$PlkNG$"$k!#7+$7!"<B:]$K%F
$rJ]B8$7$F$$$k%G!<%?$N7?$O%j%9%H$KB>$JiJ$$!#%j%9%H$r%j%s%0$H7F07$&J}K!$K$D$$$FNh$j>\$7$$O
pendix B, "kill %j%s%0$N07$$", p. 165, $r;2>H!#)

10.1 Kill %j%s%0KD$$$F$N354Q

kill %j%s%0$O%F%-%9%H7A<0$NJ8;zNs$N%j%9%H$G$"$k!#Nc$($P<!Nh$&$J7Ar7$F$$$k!#

```
("some text" "a different piece of text" "yet more text")
```

b7;d$N kill %j%s%0$,>eNbN@C?H7$F!"$3$3$G;d$, C-y $H2!$9$H!" 'some text' $H$$$&J8;zNs$,;
8=:_$$$k%P%C%U%!$N%+!<%=%k$N0LCV$KA^F~$5lk!#

yank %3%^%s%IO^$?!"%F%-%9%H$rJ#<L9kNK$b;H$olk!#%3%T!<5l$k%F%-%9%H$O%P%C%U%!$+$i@Z$j
kNGOJ/!"0lC6 kill %j%s%0KCV+$l!"$=$N8e%d%s%/$5lk3H$GA^F~$5lk3HKJ$k!#

kill %j%s%0$N%F%-%9%H$r<h$j=P$9KO;0DN4X?t$,;H$olk!#DL>o C-y$K%P%$%s%I5l$F$$$k yank, F1$8
>o M-y $K%P%$%s%I5l$F$$$k yank-pop!"$=$7$F!"$3NFsD$N4X?t$KhC$F;H$olk rotate-yank-pointer
G"$k!#

```
(insert (car kill-ring-yank-pointer))
```

yank $d yank-pop $NF/$-$rM}2r$9kK$O!"$^$:JQ?t kill-ring-yank-pointer $H!"4X?t rotate-yank-pointer$rM}2r$9kI,MW,$"$k!#

10.2 JQ?t kill-ring-yank-pointer

kill-ring-yank-pointer $O!" kill-ring $HF1$8$/JQ?t$G$"$k!#0lHL$KJQ?t$O!"$"$kbNNCMK%P%$%s
%I5lk3HG!"$=$l$r;X$7<($9F/$-r9$k!#

=>CF!"b7 kill %j%s%0NCM,

```
("some text" "a different piece of text" "yet more text")
```

G"$j!"$^$? kill-ring-yank-poiner $,FsHVL\$N0LCV$r;X$7$F$$$?H9kH!" kill-ring-yank-pointer NCMO

```
("a different piece of text" "yet more text")
```

G"$k!#A0>O$G@bL@7?h&$K (Chapter 9, "%j%9%H$OINh&$K<BAu$5lF$$$k$+", p. 77)!"7W;;5!$O kil
ring $H kill-ring-yank-pointer HK;X5l$?%F%-%9%H$r3F!9JL!9$KJ];}$7$F$$$ko1GO$J$$!# "a dif-
ferent piece of text" $H "yet more text" NFsD$N8@MU$O!"Fs=E$KJ#@=$5lF$$$kNGOJ$$$NG"$k!#$=$N
Beoj!"FsDN Lisp JQ?t$OF1$8%F%-%9%H$N=8$j$r;X$7$F$$$k!#?^$KI=$o9H<!NDLjG"$k!#

```
kill-ring      kill-ring-yank-pointer
    |                |
    |      ___ ___   |     ___ ___      ___ ___
     ---> |   |   |  --> |   |   |    |   |   |
          |___|___|----> |___|___|--> |___|___|--> nil
            |              |            |
            |              |            |
            |              |             --> "yet more text"
            |              |
            |               --> "a different piece of text"
            |
             --> "some text"
```

JQ?t **kill-ring** $H JQ?t **kill-ring-yank-pointer** $ON>J}$H$b%]%$%s%?G"$k!#$7$+$7!" kill %j%s%0$=
NbNO!"<B:]$KMWAG$rAH$_9g$o$;$?bNH7$F@bL@$5lk3H$,B?$$!#D^$j!" **kill-ring** $O%j%9%H$N
5!FbGN0LCV$r;X$7$F$$$k$H$$$&hj$O!"%j%9%H$=NbNN0UL#$G;H$olk!#$=$l$KBP$7!" **kill-ring-ya**
pointer $NJ}$O!"%j%9%HXN%]%$%s%?$H$$$&0UL#$G;H$olk3H$,B?$$!#

A4$/F1$8$3$HKD$$$F!"3&$$$&U&KFsD$N8@$$J}$r;H$&$H:G=i$O:.Mp9kh&$K;W$(k+b7lJ$
7h$/9M$(F_lP9gM}E*G"$k!# kill %j%s%0$O0lHL$K!" Emacs $N%P%C%U%!$+$i:G6a@Z$j<hil$?%F%-%
%G!<%?$+$iJC$F$$$k$HB*$(il$F$$$k!#0lJ} **kill-ring-yank-pointer** $NJ}$O!" kill %j%s%0NCfG$=$N:
=i$NMWAG ($D$^$j CAR) $,$3l+$iA^F~$9$k%G!<%?$G$"$kh&$JItJ,!"$r;X$7<($9$?$a$K;H$olk!#

rotate-yank-pointer 4X?t$O!" **kill-ring-yank-pointer** $,;X$7<($9MWAG$r8r49$9$kbNG"$k!#$h
$j>\$7$/8@$&$H!"%]%$%s%?$, kill %j%s%0$N:G8e$NMWAG$r1[$($F99$K<!$NMWAG$K0\$m$&$H9k:]$K!"<+F0E*$K
%?$r kill %j%s%0$N:G=i$NMWAG$K0\F0$7$F$/$lkN$@!#$3Nh$&$K7F%j%9%H$,$"$?$+$b%j%s%0$G$"$kh&$K
NG$"$k!# **rotate-yank-pointer** 4X?t$=$l<+?H$OC1=c$G$"$k$,!"$=$NCf?H$K$OB?$/$N:Y$+$$@bL@$,I,MW$
$k!#$3$N4X?t5Z$S!"3lhj$:$C$HC1=c$J **yank**, **yank-pop** 4X?tKD$$$F$O<!$N=j$G@bL@$9$k!# Appendix
"kill %j%s%0$N07$$", p. 165.

10.3 yank $H nthcdr KD$$$F$NN}=,LdBj

- **C-h v** (**describe-variable**) $r;H$C$F!"$"J?$N kill %j%s%0$NCM$r8+$J$5$$!#4vD+ kill %j%s%0$NMWAG
  $rA}$d7F$+$i!"b&0lEY kill %j%s%0$NCf?H$r8+J5$$!# **M-y** (**yank-pop**) $r;H$C$F kill %j%s%0$NCf$r
  $-2s$jJ5$$!#$"$J$?$N kill %j%s%0NCfKOIN/$i$$B?$/$NMWAG$,$"j^9+!) **kill-ring-max** $N
  $r8+$J$5$$!# kill %j%s%0Ob$&0lGU$G9+!)$=$lHb$^$@%F%-%9%H$N%V%m%C%/$rDI2C=PMh$^$9$+!)
- **nthcdr** $H **car** $r;H$C$F!"3F!9%j%9%H$N0lHVL\!"FsHVL\!";0HVL\!"5Z$S;MHVL\$NMWAGrJV9h&$J;M$D
  <0$r:n$jJ5$$!#

11 %k!<%W$H:F5"

Emacs Lisp $O!"01$D$J$$$7$OJ#?t$N#S<0$r7+$jJV$7I>2A$5$;$kNK!"<gH7FFsD$NJ}K!$r;}CF$$$k
DO **while** %k!<%W$rMxMQ$9kb$N!"$b$&01$D$O:F5" (*recursion*) $r;H$&bNG"$k!#

7+jJV7$OHs>o$KLr$KN)$DbNG"$k!#Nc$($P;M$D$NJ8$NJ,$@$1@h$K0\F0$7$?$$>l9gKO!"01DNJ8$@$1
$k%W%m%0%i%`$r=q$$$F!"$=$N%W%m%;%9$r;M2s7+$jJV$;$PNI$$!#7W;;5!KOK0$-$kH+HhlkH+$$$C$?46>
NG!"3Nh&$J7+$jJV7r$$$/idi;$?$H3m$G!"?M4V$Nh&$K2aEY$N7+jJV7r5$;$F7^CF%_%
d9$/$JkH$+$$$&J@32$OL5$$!#

11.1 while

FC<17A<0 **while** $O!":G=i$N0z?t$rI>2A$7FJV5l?CM$,??$+56$+$r%F%9%H9k!#$3$3$^$G$O **if** $N;~$HF
$"$k!#7+$7!"<!$K Lisp %$%s%?%W%j%?$,dk3HOAgC$H0c$C$F$$$k!#

while <0K*$$$F$b!"JV$5l?CM$,56$N>l9g$O!" Lisp %$%s%?%W%j%?$O;D$j$N#S<0 ($3$N#S<0$NK\BNItJ,)
%-%C%W$7!"$=lrI>2A7?jO7J$$!#7+$7!"JV$5l?CM$,??$N>l9g$O!" Lisp %$%s%?%W%j%?$OK\BNItJ,
7?8e!"b&01EY **while** $N:G=i$N0z?t$,??$+56$+$r%F%9%H9k!#b7!"JV5l$?CM$,$^$?bd??G"C?$
Lisp %$%s%?%W%j%?$O:FEYK\BNItJ,$r<B9T$9$k!#

while <0$N%F%s%W%l!<%H$O<!NDLjG"$k!#

```
(while true-or-false-test
  body...)
```

while <0$N??56%F%9%H$NItJ,$,??$rJV7F$$$k8B$j!"K\BNItJ,$O7+jJV7I>2A5l$k!#$3$N%W%m%;%9$O%
$H8F$Plk!#3l$O!" Lisp %$%s%?%W%j%?$,2?2s$bF1$8$3Hr7+jJV9MM;R$,!"Ht9T5!$NChJVjH;w$F$$$k
$"$k!#??56%F%9%H$N7k2L$,56$N>l9g$O!" Lisp %$%s%?%W%j%?$O$=$3$G **while** <0$N;DjNItJ,$rI>2A$9kN$r
$F!V%k!<%W$rH4$1$k!W!#

Ev$?$jA0N3H@$,!"$b$7 **while** <0$N:G=i$N0z?t$,>o$K??$rJV9H9k$H!"$=$N8e$NK\BNItJ,$O2?2s$G$
$KI>2A$5$lB3$1$k!#5U$Kb7??KJ$jF@$J$$$H9k$H!"K\BNItJ,$N<0$O7h$7$FI>2A$5lk3HOJ$$!# **whi**
$N%k!<%W$r=q$/9)Dx$H$O!"K\BNItJ,$N#S<0$NI>2A$r7+jJV7$?$$2s?t$@$1??56%F%9%H$,??$NCMrJV7!"$=$
8e!"56rJV9h&$J;E3]$r:nk3HG$"$k!#

while <0$rI>2A$7$?>l9g$KJV5lkCMO??56%F%9%H$,JV$9CMG"$k!#=>$C$FLLGr$$$3HK!"%(%i!<J/I
l? **while** %k!<%W$O!"$?H(100 2s%k!<%W$r7+$jJV7?8eGb01EY$b%k!<%W$7J+C?>l9gGb!"I,$: **nil**
$9!#@5$7$/I>2A$5l? **while** <0$O7h$7$F??$NCMrJV9$3$HOJ$$$o1@!* 3N3H$O!" **while** <0$O>o$KI{
$rL\E*$H7FI>2A5lk3Hr0UL#9k!#B($A!" **while** %k!<%W$NCf$NK\BNItJ,$N#S<0$rI>2A$9k?aKI>
kNG"$k!#$3lOM}K+JC$F$$$k!#C1$K%k!<%W$r7+jJV9$3$H$,L\E*$JNGOJ$/!"%k!<%W$NCf$N#S<
JV$7I>2A$7$?;~$K@8$8$k7k2L3=$,K>$`bNJN$@$+$i!#

11.1.1 while %k!<%W$H%j%9%H

while %k!<%W$r%3%s%H%m!<%k$9$k01HLE*$JJ}K!$O!"%j%9%H$,MWAG$r;}$C$F$$$k$+$I$&$+$r%F%9%H$9k3$
$k!#$b$7MWAG$,01DbJ1lP!"$=$l$O6u%j%9%H$G$"$j!"7k2LH7$F6u%j%9%H () $,JV$5lk!#3l$O!" n
7/$O56 (false) $NF15A8l$G$"$k!#01J}!"MWAG$r;}$D%j%9%H$N>l9g$O!"$=$liNMWAG$=$NbN$,JV$5lk!#
$O **nil** 0J30$NbN$OA4$F??$H8+Jo$9NG!"3N>l9g$O **while** %k!<%W$G$O??$,JV5l$?$3HKJk!#

Nc$($P!"<!$N#S<0$rI>2A9k$H!"JQ?t **empty-list** NCMr **nil**$K%;%C%H$9k3H,=PMh$k!#

```
(setq empty-list ())
```

3N **setq** <0$rI>2A$7$?8e!"JQ?t **empty-list** $r$$$DbNh&$K%+!<%=%k$r3N%7%s%\%kN9$08e$K;}CF$
$F C-x C-e $H%?%$%W$9$3HGI>2A7F$_$h$&!#%(%3!<NN0h$K **nil** $,I=<($5lkO:$@!#

```
empty-list
```

0lJ}!"JQ?t$rMWAG$r;}$D%j%9%H$K%;%C%H7?>l9g$O!"$=$NJQ?t$rI>2A9kH=$N%j%9%H$,I=<(5l$k!#$3
NFsD$N#S<0$rI>2A9k3H$G3N$+ailk!#

```
(setq animals '(giraffe gazelle lion tiger))

animals
```

$H$$$&3H$G!"%j%9%H **animals** $KMWAG$,$"$k$+$r%F%9%H$K;HMQ$9kh$&$J **while** loop $r:n$kKO!"%k!<
$N:G=i$NItJ,$r<!$Nh&$K=q$1Ph$$!#

```
(while animals
       ...
```

while $,:G=i$N0z?t$r%F%9%H$9kH!"JQ?t **animals** $,I>2A$5lk!#3l$O%j%9%H$rJV$9!#$3$N%j%9%H$,MW
;}CF$$$k8B$j!" **while**$O%F%9%H$N7k2L$,??$@$HH=CG9k!#7+$7!"%j%9%H$,6uKJkH!"7k2L$O56$@$HH
lk!#

while %k!<%W$,L58B$KB3$/$3HrHr1k$?$aKO!":G=*E*$K%j%9%H$,6uKJkh$&$J2?i+$N;E3]$,I,M
$k!#$h$/;H$olk%F%/%K%C%/$O!" **while** <0$NK\BNItJ,$N7A<0$N0lDG$=$N%j%9%HNCMr$=$N%j%9%H$N **cdr** $
49$($kh&K7F*$/$3HG$"$k!# **cdr** 4X?t$,I>2A$5lk4HK=$N%j%9%H$OC;$/$JCF$$$-!"$D$$$K$O
%H$,;D$5lk$H$$$&o1G"$k!#$=$&$JkH **while** %k!<%W$N%F%9%H$O56rJV7!" **while**$N0z?t$ObO$dI>2A
$:!"%k!<%W$,=*N;9k!#

Nc$($P!"F0J*$N%j%9%H$,JQ?t **animals** $K%P%$%s%I5l$F$$$?;~$O!"<!$N#S<0$r;H$CF=$NJQ?t$r85$N%j%
CDR $K%;%C%H$9k3H,=PMh$k!#

```
(setq animals (cdr animals))
```

b70l$DA0$N#S<0$rI>2A$7F"C?Ji!"3N#S<0$rI>2A$9kH%(%3!<NN0h$K **(gazelle lion tiger)** $,
<(5lkO$:$@!#b&0lEY3N#S<0$rI>2A$9kH!":#EY$O **(lion tiger)** $,I=<($5lk!#99$KI>2A$9k
(tiger) $,I=<($5$l!"$=3G$^$?I>2A9k$H!"$dCH6u%j%9%HKJCF!" **nil** $,I=<($5lk!#

cdr 4X?t$r7+$jJV$7;H$&3H$G:G=*E*$K??56%F%9%H$G56$rJV$9 **while** %k!<%W$N%F%s%W%l!<%H$O<!$Nh&
$k!#

(while *test-whether-list-is-empty*
  body...
  set-list-to-cdr-of-list)

3N%F%9%H$H **cdr** $NMxMQ$rAH9g$;$F!"%j%9%H$N3FMWAG$r3F!90l9T4H$KI=<($9kh$&$J4X?t$r:n$k3H$
$k!#$3lr<!$K@bL@$9k3HK7h$&!#

11.1.2 %j%9%H$r;H$C$?%k!<%W$NNc: `print-elements-of-list`

%j%9%H$r;H$C$? **while** %k!<%W$N3H$rM}2r$9kK$O **print-elements-of-list** 4X?t$r8+$k$HNI$$!#

3N4X?t$O!"=PNO$rI=<(9k$?$a$K4v$D$+$N9TrI,MWH9k!#%(%3!<NN0h$O0l9T$7$+$J$$$N$G!":#$^$G
FMh?h&$K Info NCfGI>2A9kh&Jd$jJ}$GO=$NF0:nr&$^$/IA<L=PMh$J$$!#BeojKI,MWJ#
'***scratch***' %P%C%U%!$K%3%T!<$7$F!"$=3G$=$lirI>2A9kI,MW$,$"$k!#%3%T!<$9kK$O!"$^$:BP>]$H
%j!<%8%g%s$N:G=i$r **C-SPC** (**set-mark-command**) $G%^!<%/$7F+$i%+!<%=%k$r%j!<%8%g%s$N:G8e$K0\F0$7
M-w (**copy-region-as-kill**) G=$N%j!<%8%g%s$r%3%T!<9k!#$=$7$F '***scratch***' %P%C%U%!$G **C-y** (**yank**)
9k3H$G!"$=$N#S<0$r<h$j=P$;Ph$$!#

'***scratch***' %P%C%U%!K=$N#S<0$r%3%T!<7?$i!":#EY$O$=$N#S<0$rI>2A$9kN$@$,!":G8e$N **(print-
elements-of-list animal)** $O **C-u C-x C-e** $H%?%$%W7FI>2A9kI,MW$,$"$k!#$D$^$j **eval-last-sexp**
$KA0CV0z?t$rM?$($kNG$"$k!#9k$H!"I>2A$7$?7k2L$O%(%3!<NN0hGOJ/ ***scratch*** %P%C%U%!$KI=<($5$
(C1$K **C-x C-e** H9k@1@$H!"JV$5l?CM$O%(%3!<NN0h$K **^Jgiraffe^J^Jlion^J^Jtiger^Jnil** Nh$&
$KI=<($5lF7^$&!#$3$3$G=PFMhk '**^J**' $O2~9T$rI=7F$$$k!#=>CF ***scratch*** %P%C%U%!GO3F!9$NC1
0l9T4H$KI=<($5lk3HKJko1G$"$k!#3N3H$O!":# Info %P%C%U%!$G<!$N#S<0$rI>2A7F$_$F$b
il$k!#)

```
(setq animals '(giraffe gazelle lion tiger))

(defun print-elements-of-list (list)
  "Print each element of LIST on a line of its own."
  (while list
    (print (car list))
    (setq list (cdr list))))

(print-elements-of-list animals)
```

$3$1iN;0DN#S<0$r=g$K '*scratch*' %P%C%U%!$GI>2A$7$F$$$/$H!"$=$N%P%C%U%!$NCf$G<!$Nh&$KI=<($5
O:$@!#

```
giraffe

gazelle

lion

tiger
nil
```

%j%9%H$N3FMWAG$,3F!90l9T4H$KI=<($5$l ($3$1$O print $N;E;v$G$"$k), $=$7$F:G8e$K3N4X?t<+BN$,J
CM$,I=<($5lk!#3N4X?tNCfN:G8e$N#S<0$O while %k!<%WG"$j!" while %k!<%W$O>o$K nil rJV9N
nil $,%j%9%H$N:G8e$NMWAG$N8e$KI=<($5lk!#

11.1.3 A}2C9k%+%&%s%?$r;H$C$?%k!<%W

%k!<%W$O;_$^kY$-;~$K;_$^$CF/lJ$$$3HKOLrKN)$?$J$$!#%j%9%H$r;H$C$?%k!<%W$N@)8f0J30$N0
J}K!H7FO!":G=i$N0z?t$H7F!"@5$7$$2s?t$@$17+jJV9$H56$rJV$9%F%9%H$r=q$/$H$$$&J}K!$,$"$k!#$
%k!<%W$,%+%&%s%? — D^$j%k!<%W$r7+jJV7$?2s?t$r?t$($k#S<0 — $r;}$D$H$$$&3HG"$k!#

??56%F%9%HH7FO!" (< count desired-number) $H$$$C$?#S<0$,;H$($k!#$3$1$O count NCM,4|BT9k
7+jJV7$N?t desired-number hj$b>.$5$1lP!" t $H$$$&??NCMrJV$7!" desired-number 0J>e$G$"$1
$P!"56$NCM nil rJV9!#%+%&%s%?$rA}2C$5$;$k#S<0$O (setq count (1+ count)) $H$$$C$?$4$/4JC1$J setq
<0Gh$$!#$3$3$G 1+ $O Emacs Lisp NAH_9~$_4X?t$G!"0z?t$K 1 $r2C$(kbNG$"$k!# ((1+ count) $O (
count 1) H7FbF1$8$@$,!"$3$NJ}$,?M4VKHCFFI$_$d$9$$$G$"$m$&!#)

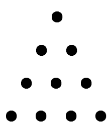
$H$$$&3H$G!"A}2C$9$k%+%&%s%?$r;HC? while %k!<%W$N%F%s%W%l!<%H$O<!Nh$&$KJk!#

set-count-to-initial-value
```
(while (< count desired-number)         ; ??56%F%9%H
```
body...
```
  (setq count (1+ count)))                     ; %$%s%/%j%a%s%?
```

3N>l9g count $N=i4|CM$rDjaJ$1$1PJiJ$$$3HKCm0U7h$&!#DL>o$O 1 $K%;%C%H$9$k!#

A}2C%+%&%s%?$NNc

$"$J$?$$OIMJU$GM7$sG*$j!">.@P$G;03Q7A$r:n$m$&$H;WC?H7h&!#$^$:!"0l9TL\$K 1 DN>.@PrCV-
L\$K 2 DCV-!";09TL\$K 3 DCV/..., $H$$$&6q9g$KB3$1$F$$$/N@!#?^GIA/$H<!$Nh&$J46$8KJ$k!#



(Ls 2500 G/A0!"%T%?%4%i%90lGIO3Nh$&$JLdBj$r9M$($F?tO@$N=iJb$rH/E8$5$;$F$$$C$?!#)

$3$3$G!"<79T$N;03Q7A$r:n$kKO$$$/DN>.@P$,I,MW$+rCNj$?$$$H;WC?H9$k!#

EvA3!"$3$3G"J?$,$7J1lPJi$J$$$N$O 1 $+$i 7 $^$G$N?t$r2C$($k3HG"$k!#$3lr9T$&$K$OE
$NJ}K!$,$"$k!#>.$5$$?t$+$i;OaF 1!" 2!" 3!" 4!"... $H$$$&?tNs$r2C$($F9T$/$+!"Bg$-$$J}$+$i;OaF 7!
5!" 4!"... $H$$$&?tNsNOBr<hk+G"$k!#$IAi$N>l9g$K$b **while** %k!<%W$r=q$/;~$N6&DL$NJ}K!$r@bL@$7
lkNG!"3N2<$+$iEPkN$H!">e$+$i9_$jkN$HN>J}$NNc$r:n$CF_h&$H;W$&!#:G=iNNcH7F 1 $K 2
4 $r2C$($F$$$/bN$+$i;Oah$&!#

OB$r<h$k?t$N%j%9%H$,C;$$>l9g$O!"0lEY$KA4ItB-7F7^$&$N$,$bCH$b4JC1$JJ}K!G"$k!#$7$+$7J,
$7A0$bCF?t$N%j%9%H$,Il$/$i$$$ND9$5$KJk$+J,$iJ+C?$j!"0?$$$O6KaFD9$$%j%9%H$N>l9g$K$bB
$$>l9gKO!"J#;($J%W%m%;%9$r0lEYKdkhj+$OC1=c$J%W%m%;%9$rBt;37+$jJV7FOB$r5a$akh$&$JJ}K
kI,MW,$"$k!#

Nc$($P!">.@P$r0lEY$KA4It2C$($kBeoj$K!"$^$::G=i$N9T$N>.@P$N?t 1 $KFs9TL\$N>.@P$N?t 2 $r2C$(!"<!
9g7W$K;09TL\$N>.@P$N?t 3 $r2C$(!":#EYO=NOBK;M9TL\$N?t 4 $r2C$(!"$H$$$&A`:n$rB3$1kNG"$k!#

3N%W%m%;%9$NBg@Z$JFCD'$O!"7+$jJV$79T$&A`:n$,C1=c$@$H$$$&3HG"$k!#:#$N>l9g!"3F!9$N%9%F%C%W
$F$$$k3H$O!"Fs$D$N?t$r2C$($k$H$$$&3H$@$1G"$k!#$=$N;~E@$G$N9T$N>.@P$N?t$H!"$=$l$^$G$N9g7W
J,CF$$$k!#3NFs?tNOBr<h$k%W%m%;%9$O!":G8e$N9T$N?tr=l^GN9g7W$K2C$(k^$G2?2s$G$b7+$j
$k!#$bCHJ#;($J%k!<%W$G$O!"7+$jJV$79T$&A`:nO=$lDxC1=c$GOJ$$!#7+7=lG$bA4$F$r0lEY$Kd
$:$C$H4JC1$JNG$"$k!#

4X?tDj5A$N3FItJ,

A0@aGNJ,@O$O!"2f!9$N4X?tDj5A$N9|AH$_$rM?$(F/lk!#$^$:!">.@P$NA4BN$N?t$rI=$o$9JQ?t$,MW$k!#
total H7$F$$$$$@m&!#3l$,$3$N4X?t$NJV$9CM$G$"$k!#

<!$K!"$3$N4X?t$K$O;03Q7A$NA49T?t$rI=$o$90z?t$,MW$k!#$3lO **number-of-rows** H7$FNI$$$@m&!#

:G8e$K!"%+%&%s%?$H7F;H$&JQ?t$,I,MWG"$k!#$3lO **counter** H7Fb9=oJ$$$N$@$,!"$=$lhj$b
number H9$kJ}$,NI$$!#2?8NJi!"3N%+%&%s%?$,$dk3HO9T$r?t$(k3HG$"$j!"%W%m%0%i%`$O=PMh$
J,jd9/=q$/$Y$-$bN@$+$iG"$k!#

Lisp %$%s%?%W%j%?$,3N4X?tFb$N#S<0$NI>2A$r3+;O$9kH!"$^$: **total**NCM,Nm$K%;%C%H$5lk!#3l$O
2?$b2C$($F$$$J$$$+iG$"$k!#<!$K!":G=i$N9T$N>.@P$N?t$,B-$5lk!#$=$7$FFs9TL\$N?t$r2C$(!";09TL\$
$(!"$H$$$&U&$KB3$-!":G8e$N9T$N>.@P$r2C$($?$H3m$G=*N;$9$k!#

total $b **row-number** $b6&$K3N4X?tFbItG7$+;H$olJ$$!#=>CF!" **let** $r;H$C$F6I=jJQ?t$H7F@k
$7!"=i4|CM$rM?$($lPh$$!#L@i+$K **total** $N=i4|CM$O 0 G"$j!"$^$? **row-number** $N=i4|CM$O 1 G"$k!#
$$$&3H$G!" **let** <0$O<!Nh$&$KJk!#

```
(let ((total 0)
      (row-number 1))
  body...)
```

FbItJQ?t$,@k8@$5lF=i4|CM$K%P%$%s%I5l$?$J$i!" **while** %k!<%W$r3+;O9k!#%F%9%H$NItJ,$N#S<0$O
number $, **number-of-rows**0J2<$G$"$k>l9g$=$N;~N_ **t** rJV9h&JbNGJ1lPJi$J$$!#(**row-number** $H **number-of-rows** $,0lCW$9$k>l9g$b4^aJ$$$H:G8e$N9T$N>.@P$N?t$,2C$($ilJ$$$3HKCm0U!#)

Lisp KO **<=** $H$$$&!":G=i$N0z?t$,FsHVL\$N0z?t0J2<$N>l9g$K??rJV7!"$=$&GJ$$>l9g$O56$rJV$94X?
$k!#$3lr;H$&$H!" **while** <0$N%F%9%HItJ,$N#S<0$O<!$Nh&$K=q$1$k!#

```
(<= row-number number-of-rows)
```

A4BN$N>.@P$N?t$O!"3F!9$N9T$N>.@P$N?tr=l^GN9g7W$K7+$jJV$72C$($F$$$/3H$G7W;;$5lk!#$"$k
@P$N?t$O$=$N9T$NHV9f$H0lCW9kNG!"A4BN$N?t$O9T$NHV9f$r2C$($F$$$/3H$G5a$^k3HKJk!#(8@$
$J$$$,!">u67$,J#;($J>l9gKO!"$"$k9T$N>.@P$N?tH=$N9T$NHV9fHObC$HJ#;($J4X78$G7k$PlF$$$k!
$&>l9g$O9THV9f$OB>$NE,Ev$J#S<0$GCV-49(k3HKJk!#)

```
(setq total (+ total row-number))
```

3N#S<0GO **total** $N?7$7$$CMH7F=1^GN9g7W$K8=:_$N9T$N>.@P$N?t$r2C$($?$bNr%;%C%H7F$$$

total NCMr%;%C%H7?$i!"<!$N%k!<%W$K0\$k>l9gN?aK>r7o$r@0$(F*$+$J1lPJiJ$$!#$=$l$
%+%&%s%?MQ$NJQ?t **row-number** NCMK 1 $r2C$(lPNI$$!# **row-number** NCM, 1 A}d5lk$H!"<!$N%k!<%W
while <0$N@hF,$N??56%F%9%H$G!"$3$N?7$7$$CM$, **number-of-row**$NCM0J2<G"k+$,H=Dj$5lk!#b7$=$
$"$l$P!"JQ?t **row-number**$N?7$7$$CM$,A02s$N%k!<%WGN **total** NCMK2C$($ilk!#

Emacs Lisp NAH_9~$_4X?t **1+** $O?t$K 1 $r2C$(F/lk!#=>CF!" **row-nubmer** JQ?t$O<!$N#S<0$G 1 A}2C
5;k3H,=PMh$k!#

```
(setq row-number (1+ row-number))
```

3FItJ,$NAm9g

3l$^$G$G4X?tDj5A$N3F!9$NItJ,$r=q$$$?NG!"$3$3G=li$r0l$DK^Hak3HK7h$&!#

$^$: **while** <0$NCf?H$O<!NDLj!#

```
(while (<= row-number number-of-rows)   ; ??56%F%9%H
  (setq total (+ total row-number))
  (setq row-number (1+ row-number)))    ; %$%s%/%j%a%s%?
```

3l$K **let** <0$NJQ?t%j%9%H$r2C$(lP$[$\4X?tDj5A$NK\BNItJ,$O40@.9k$,!":G8e$K$[$s$N>/$7$@$12C$
$-MWAG$,$"$k!#

$=$l$OJQ?t **total** $=$l<+?H$r **while** <0$N8e$K=q$/3HG"$k!#$=$&$7$J$$$H4X?tA4BN$,JV$9CM$O **let** <
K\BNItJ,$N:G8e$N#S<0$,JV$9CM!"B($A **while** <0$,JV$9CM$KJkNG!">o$K **nil** $,JV$5lF7^$&$+iG$"$

3N3HOQCH8+$?$@1G$O5$$,D+$J$$$+b7lJ$$!#CM$r 1 A}2C$5$;$k<0$,:G8e$@$+$iNI$$$h$&$K
$+$b7l$J$$$,!"3lO"$/$^$G **while**<0$N0lItJNG"$k!#%7%s%\%k **while** $+$i;O$^$k%j%9%H$N:G8e$NMW
N@!#99$K **while** %k!<%WA4BN$O **let** <0$NK\BNItJ,$NCf$N%j%9%H$JNG$"$k!#

Bg6CQK=q$/$H4X?t$O<!$Nh&$J7A$r7F$$$k!#

```
(defun name-of-function (argument-list)
  "documentation..."
  (let (varlist)
    (while (true-or-false-test)
      body-of-while... )
      ... )                      ; $3$3$K:G8e$N<0$,Mh$k!#
```

3Nh&$KDj5A$5l?4X?t$,JV$9CM$O **let** <0$,JV$9CM$KJk!#$H$$$&Nb **let** $O **defun** 0J30$NB>NI$
%9%HKb4^$^$lFO$$$J$$$+iG$"$k!#$@$+$i!"$b$7 **while** $, **let** <0$NK\BN$N:G8e$N#S<0G"lP!"3N
$O>o$K **nil** rJV7F7$^$&3HKJ$k!#$3lO2f!9$,K>$`7k2LGO$J$$!* 3l$r2sHr$9kK$O!"C1$K%7%
total $r **let** $G;O$^$k%j%9%H$N:G8eKCV1$PNI$$!#3N<0O3$N%j%9%H$NB>$N#S<0$,I>2A5l$?8e$KI>2A
$k!#$3lKhC$F!"A4BN$H7F@5$7$$CM$,JV$5lk3HKJ$k!#

let $G;O$^$k%j%9%HA4BN$r0l9T$GI=<($7F_kH!"M}2r7d$9$$$@m&!#3&=q$/$HJQ?t%j%9%H *varlis*
while <0$, **let** <0$NFsHVL\$H;0HVL\$NMWAGG"k3H,h/J,$k!#$=7F:G8e$NMWAG$, **total** KJko$
$"$k!#

```
(let (varlist) (while (true-or-false-test) body-of-while... ) total)
```

0J>e$r0l$DK^HakH!" **triangle** 4X?t$NDj5A$O<!Nh$&$KJk!#

```
(defun triangle (number-of-rows)    ; %$%s%/%j%a%s%?$r;H$C$?
                                    ;   %P!<%8%g%s!#
  "Add up the number of pebbles in a triangle.
The first row has one pebble, the second row two pebbles,
the third row three pebbles, and so on.
The argument is NUMBER-OF-ROWS."
  (let ((total 0)
        (row-number 1))
    (while (<= row-number number-of-rows)
      (setq total (+ total row-number))
      (setq row-number (1+ row-number)))
    total))
```

3l$rI>2A$7$F **triangle** $r%$%s%9%H!<%k7?8e!"<B:]$K;n$7F_h&!#FsDNNc$r5s$2$k!#

```
(triangle 4)

(triangle 7)
```

:G=i$N 4 DN?tNOBO 10 KJ$j!":G=i$N 7 DN?tNOBO 28 KJ$k!#

11.1.4 8:>/9k%+%&%s%?$r;H$C$?%k!<%W

while %k!<%W$N%F%9%HItJ,$Nb&0lDN0lHLE*$J=q$-J}H7FO!"%+%&%s%?$,Nm$r1[$($k$+$I$&$+$rH=D
$H$$$&bN$,$"$k!#%+%&%s%?$,NmhjBg$-$$4V$O%k!<%W$r7+jJV9$,!"Nm0J2<$KJk$H;_$^kH$$$&o1$
3Nh&$KF0:n$5$;$k$?$aKO%+%&%s%?$ONm0J>e$N?t$+$i;OaF7+jJV7$NItJ,$,I>2A5lk4HK>.5
$&$K7J1lPJiJ$$!#

%F%9%HItJ,$O **(> counter 0)** Nh$&$KJk!#3l$O **counter** NCM,NmhjbBg-1l$P??$H7F **t** $rJ
$7!"Nm0J2<$J$i56$H7F **nil** rJV9$H$$$&bNG"$k!#?t$r<!Bh$K>.$5$/$7$F$$$/KO!" **(setq counter (
counter))** $H$$$&C1=c$J **setq** <0$r;H$&!#$3$3$G!" **1-** $O0z?t$r 1 8:i9 Emacs Lisp NAH_9~$_4X?t$G$"
$k!#

$H$$$&3H$G!" **while** %k!<%W$N%F%s%W%l!<%H$O<!$Nh&KJ$k!#

```
(while (> counter 0)                   ; ??56%F%9%H
  body...
  (setq counter (1- counter)))         ; %G%/%j%a%s%?
```

8:>/9k%+%&%s%?$r;H$C$?Nc

8:>/9k%+%&%s%?$r;H$C$?%k!<%W$r@bL@9k$?$a$K!" **triangle** 4X?t$r!"3Nh&$J%+%&%s%?$r;HCF=c
7F$_$k3HK9$k!#

?t$(J}$O!"3N4X?t$NA02s$N%P!<%8%g%s$N5U$G$"$k!#:#2s$O!"Nc$($P;09T$+iJ$k;03Q7A$N>.@P$N?t$r5a
aK!"$^$:;09TL\$N 3 DN>.@P$r2C$(!"<!K=$NA0$NFs9TL\$N 2 8D$N>.@P$N?t$r2C$(!"99K=$N9g7W$K 1 9T
@P$N?t 1 $r2C$(kH$$$&A`:nr9k3HKJk!#

F1MMK7$F!"<79T$+iJ$k;03Q7A$N>.@P$N?t$r5aakKO!"<79TL\$N>.@P$N?t 7 K=$NA0$N9T$N>.@P$N?t
$(!"<!$K$=$N9g7W$K $=$NA0$N9T$K>.@P$N?t 5 $r2C$(!"HdCF$$$/3HKJ$k!#A02s$NNc$HF1$8$/!"3F!9
;;GO$=$l$^$G$N9g7W$H8=:_$N9T$N>.@P$N?t$NFsDN?t$r2C$($F$$$k$@$1G"$k!#$3$N%W%m%;%9$O!"B-$9>
$,$J$/$Jk^$G7+$jJV5l$k!#

:G=i$K2C$($k>.@P$N?t$bJ,$k!#:G8e$N9T$N>.@P$N?t$OA4BN$N9T$N?tKEy7$$$+iG$"$k!#;03Q7A$,<79T$
$F$$$l$P!":G=*9T$N>.@P$N?t$O 7 G"$k!#F1MM$K!"<!!9$HB-$7$F$$$/>.@P$N?t$bJ,$k!#$=lO!"A02sB-7
1 $r0z$$$?bNG"$k!#

4X?tDj5A$N3FItJ,

$^$:;0DNJQ?t$,I,MW$G$"$k!#;03Q7A$N9T$NAm?t!"3F!9$N9T$N>.@P$N?t!"$=7F!">.@P$NAm?t$@!#3N:
$,:#2s5a$ah&H7$F$$$k?tG"$k!#$3$1$i;0DNJQ?t$r3F!9 **number-of-rows**, **number-of-pebbles-in-row**, **total** $HL>IU$k3HK9$k!#

total $b **number-of-pebbles-in-row** b3$N4X?t$NFbItG7$+;H$olJ$$$N$G!" **let** $rMQ$$$F@k8@5l
$k!# **total** $N=i4|CM$OL^O@NmG"$k!#0lJ}!" **number-of-pebbles-on-row** $N=i4|CM$O;03Q7A$N9T$N?tKEy
$/$JkY$-$G$"$k!#$3$1$O!"$bCH$bD9$$9T$+$i>.@P$N?t$r?t$($F$$$/$?$aG"$k!#

=>CF **let** <0$N;O$a$NItJ,$O<!Nh$&$KJk!#

```
(let ((total 0)
      (number-of-pebbles-in-row number-of-rows))
  body...)
```

>.@PA4BN$N?t$O!"3F!9$N9T$N>.@P$N?t$r=gHV$K?t$($F$$$/3H$G5a$ail$k!#$D$^$j!"7+jJV7<!$N#S<0
7F$$$1Ph$$!#

```
(setq total (+ total number-of-pebbles-in-row))
```

number-of-pebbles-on-row $O **total** $K2C$(il$?8e!"<!$N%k!<%WKHw($F01$D$@$1CM$r8:$i5J1lPJ
iJ$$!#$H$$$&Nb<!$K2C$(il$k9T$O01CJ>e$N9T$G$"$j!"8=:_$ND9$5hj$b01$DJ,C;$$$+iG$"$k!#3
#S<0$rI>2A$9k3HGJ5lk!#

```
(setq number-of-pebbles-in-row
      (1- number-of-pebbles-in-row))
```

:G8e$K!">.@P$,L5$/$JC?;~E@$G **while** loop $rH4$1J1lPJi$J$$$,!"$=$N$?$a$N>r7oIt$O<!Nh$&
C1JbNG$h$$!#

```
(while (> number-of-pebbles-in-row 0)
```

3FItJ,$NAm9g

0J>e$N#S<0$rRH$^$HaK9k$H!"4X?tDj5A$O<!Nh$&$KJk!#

```
;;; %G%/%j%a%s%?$r;H$C$?:G=i$N%P!<%8%g%s!#
(defun triangle (number-of-rows)
  "Add up the number of pebbles in a triangle."
  (let ((total 0)
        (number-of-pebbles-in-row number-of-rows))
    (while (> number-of-pebbles-in-row 0)
      (setq total (+ total number-of-pebbles-in-row))
      (setq number-of-pebbles-in-row
            (1- number-of-pebbles-in-row)))
    total))
```

$3$1O3$1$G!"$&$^$/F0:n$9$k!#

7+7J$,$i!"<B$OJQ?t **number-of-pebbles-in-row** OI,MWG$J$$!*

triangle 4X?t$,I>2A$5$1$k$H!"%7%s%\%k **number-of-rows** $O=i4|CM$rM?$($i1F!"$"$k?t$K%P%$%s%I$5
$k!#$3$N?t$O4X?t$NK\BN$NCfG"$?$+$b6I=jJQ?t$G$"$k$+$N4H$/JQ2=$5$;$k3H$,2DG=$G!"3N4X?t$N3
$NJQ?t$NCMKO2?$N1F6A$bM?$($k?4G[OJ$$!#$3$1$O **Lisp** $NBgJQJXMx$JFCD'G"k,!"3N3H$+$i4X
number-of-pebbles-in-row $rA4$FJQ?t **number-of-rows** GCV-49$($F$bNI$$$3H,J,$k!#

$H$$$&3H$G!"0J2<$K!"3N4X?t$N>/$7@0M}7?%P!<%8%g%s$r5s$2$k!#

```
(defun triangle (number)                ; FsHVL\$N%P!<%8%g%s!#
  "Return sum of numbers 1 through NUMBER inclusive."
  (let ((total 0))
    (while (> number 0)
      (setq total (+ total number))
      (setq number (1- number)))
    total))
```

$^$HaF$_$h$&!#$-As$H=q$+l? `while` %k!<%W$O0J2<$N;0DNItJ,$+$iJk!#

1. %k!<%W$r@5$7$$2s?t7+jJV7$?8e!"56$rJV$9%F%9%H
2. 7+jJV7I>2A5l$?8e!":G8e$KK>$`CM$rJV9h$&$J#S<0
3. @5$7$$2s?t$@$1%k!<%W$r7+$jJV7?8e$K%F%9%H$,56rJV9h&!"??56%F%9%HKEO5lkCM$rJQ2=$5$;$k

11.2 :F5"

:F5"4X?tHO!"<+J,<+?H$rI>2A$9kh$&$J%3!<%I$r4^$s$G$$$kbNG"$k!#4X?t$,<+J,<+?H$rI>2A$7$?>
1O$^$?<+J,<+?H$rI>2A$9$k%3!<%I$K=P$/$o$9!#7k2L$H7F$=$N4X?tO^$?<+J,<+?H$rI>2A$7 ... HJCF
$:$C$HB3$/!#:F5"4X?t$O<+J,<+?H;_$a$k>r7o$rM?$($ilJ$$8B$j!"1J5W$K<+J,<+?H$r7+$jJV$78F$S=P$7B3$
KJ$k!#

:F5"4X?t$O!"E57?E*$K$O<!$Nh&$J;0$D$NItJ,$+iJ$k>r7oJ,4tIt$r4^sG$$$k!#

1. 3N4X?t$,$b$&0lEY8F$S=P5lk+I&$+$r7hDj9k??56%F%9%H!#$3$3GO *do-again-test* $H8F$V!#
2. 3N4X?t$NL>A0
3. >r7oJ,4tIt$,@5$7$$2s?t$@$17+jJV7$r9T$C$?8e$K56rJV9h&K9k?aN#S<0!#$3$3GO *next-s*
   expression $H8F$V!#

:F5"4X?t$O!"B>$N<oN`$N4X?t$KHfYF:G$b4JC1$J7A$K=q$1$k!#<B:]!":F5"4X?t$r;H$$;Oak$H!"$7P7$P
DxC1=c$J7A$KJCF7$^$$!"IT2D2r$J46$8$,$9k3H,B?$$$h$&$G$"$k!#:F5"4X?t$NDj5A$rFI$`$?aK$O!
$N%3%D$,I,MW$G!":G=i$OFq7/;W$($F$b!"47$lkHC1=cG"k3H,J,CF$/$k!#=iaF<+E><V$K>h$kH
G"$k!#

:F5"4X?t$N%F%s%W%l!<%H$O<!Nh$&$KJk!#

(`defun` *name-of-recursive-function* (*argument-list*)
  "*documentation...*"
  body...
  (`if` *do-again-test*
    (*name-of-recursive-function*
        next-step-expression)))

:F5"4X?t$,I>2A$5lk4H$K!"$"$k0z?t$, next-step-expression NCMK%P%$%s%I$5$l!"$=7F$=$NCM$, d
again-test $G;H$olk!# next-step-expression $O4X?t$rb&7+jJV9I,MW$,$J$/$JC?>l9g$K do-again-test
$,56$rJV9h$&$K@_7W5l$F$$$k!#

do-again-test $O *stop condition* Hb8FPlk3Hb$"$k!#3l$O%F%9%H$,56$N>l9g$K7+jJV7$,;_$^k+$
G"$k!#

11.2.1 List $r;H$C$?:F5"

@h$K5s$2$?!" `while` %k!<%W$r;HC?%j%9%H$NMWAG$rI=<(9k4X?tNNcO!":F5"E*$K=q$/3H$b2DG=$G$"$
$K!"JQ?t `animals` NCMr$"$k%j%9%H$K%;%C%H9k#S<0$b4^aF!"$=$N%3!<%I$r=q$$$F$_$k3HK7h&!#

3NNc$O '`*scratch*`' %P%C%U%!$K%3%T!<7F!"3F!9$N#S<0$r$=$N%P%C%U%!$GI>2A$7FdiJ$1$1PJiJ
$=$7$F (`print-elements-recursively animals`) $rI>2A$9$k:]$O `C-u C-x C-e` $r;H$&I,MW$,$"$k!#$G$J
$$$H!" Lisp %$%s%?%W%j%?$O7k2L$r%(%3!<NN0h$K0l9TJ,$@$1$7$+I=<(7F$/$l$J$$!#

$^$?!"%+!<%=%k$r print-elements-recursively 4X?t$N:G8e$NJD$83g8L$ND>8e$N!"%3%a%s%H$N<jA0$N0LC
$K;}$C$F$$$C$FI>2A$7$J$$$H$$$1$J$$!#$=$&7J$$$H!" Lisp %$%s%?%W%j%?$O%3%a%s%H$^$GI>2A7h$&$H$7
$&!#

```
(setq animals '(giraffe gazelle lion tiger))

(defun print-elements-recursively (list)
  "Print each element of LIST on a line of its own.
Uses recursion."
  (print (car list))                  ; K\BN
  (if list                            ; do-again-test
      (print-elements-recursively     ; :F5"8F$S=P$7
       (cdr list))))                  ; next-step-expression

(print-elements-recursively animals)
```

print-elements-recursively 4X?t$O:G=i$K%j%9%H$N0lHVL\$N0z?t!"B($A!"%j%9%H$N CAR $rI=<($9$k!#
$=$7Fb$7%j%9%H$,6uGJ1l$P!"$3$N4X?tFb$G<+J,<+?H$r8F$S=P$9!#$?$@$70z?tH7FO!"A4BN$N%j%9%
$/FsHVL\0J9_$NMWAG$+$iJk%j%9%H!"B($A!"$=$N%j%9%H$N CDR rEO9!#

3N;~$NI>2A$G$O!"$3$N4X?t$O0z?tH7$F<u$1<hC?%j%9%H$N:G=i$NMWAG ($3$1$O85!9$N%j%9%HGOFsHV
AGG"$?$k) $rI=<($9$k!#$=7F if <0$,I>2A$5$l!"$=l,??G"lP!"3N4X?t$O<+J,<+?H$r:#2s<u$1<h
?t$N CDR ($3$1$O!"85!9$N%j%9%H$N CDR $N CDR G"$k) $r0z?t$H7F:FEY<+J,<+?H$r8F$S=P$9!#

4X?t$,<+J,<+?H$r8F$S=P$9EY$K!"0z?t$H7FEO5l$k%j%9%H$O85!9$N%j%9%H$KHfYFC;$/$JCF$$$-!"7
$F:G8e$K$O6u$j%9%HHHbK8F$S=P$9$3$HKJ$k!# print 4X?t$O6u$j%9%H$r nil H7$FI=<($9$k!#$=7F<
7oJ,4t$NItJ,$, list NCMr%F%9%H9k!# list $O nil JN$G!" if <0$O56rJV7!"bO$d then-part $O<B9
7J$$!#4X?tA4BNH7FO nil $,JV$5lkNG!"3N4X?t$rI>2A$9kH:G8e$KFs2s nil $,8=$l$k!#

(print-elements-recursively animals) $r '*scratch*' %P%C%U%!$GI>2A9k$H!"<!$Nh&$J7k2L$,
I=<(5lkO$:$@!#

```
giraffe

gazelle

lion

tiger

nil
nil
```

(:G=i$N nil $O6u%j%9%H$NCM$,I=<($5l?bNG"$j!"FsHVL\$N nil $O4X?tA4BN$NCMG"$k!#)

11.2.2 %+%&%s%?NBeojK:F5"$r;H$&

A0@a$G@bL@$7$? triangle 4X?t$b$^$?:F5"E*$K=q$1$k!#$3lO<!Nh$&$KJk!#

```
(defun triangle-recursively (number)
  "Return the sum of the numbers 1 through NUMBER inclusive.
Uses recursion."
  (if (= number 1)                    ; do-again-test
      1                               ; then-part
    (+ number                         ; else-part
       (triangle-recursively          ; :F5"8F$S=P$7
        (1- number)))))               ; next-step-expression

(triangle-recursively 7)
```

3l$rI>2A$9k3HG3N4X?t$r%$%s%9%H!<%k$7!";n$7$K (triangle-recursively 7) $rI>2A$7F_h&
(%+!<%=%k$r4X?tDj5A$ND>8e$N!"%3%a%s%H$N<jA0$N0LCV$K;}CF$$$C$FI>2A$9k3HrK:l:$K!#)

3N4X?t$,$INh$&$KF0:n9k$+$r3N$+$ak?$a!"$3$N4X?t$K 1!" 2!" 3!" 4 Ey$NMM!9$J0z?t$rM?$($?>l9
$,5/$-k+$r9M$(F_h&!#

$^$:0z?tNCM, 1 $@$HI&Jk$+!)

3N4X?tGO@bL@J8;zNs$N8e$K if <0$,$/$k!#$3lO number NCM, 1 $+$I$&$+%F%9%H9kbNG"$k!#
1 G"lP!" Emacs $O if <0$N then-part $rI>2A$9$k!#$3$N>l9g$O4X?tNCMH7F 1 $,JV$5lk!# (0l9T$+$i
$k;03Q7A$NCfKO>.@P$O 1 D7$+$J$$!#)

GO0z?tNCM, 2 G"lPI&$@$m$&!#$3$N>l9g$O Emacs $O if <0$N else-part $rI>2A$9$k!#

:#$N>l9g!" else-part $OB-$7;;$H triangle-recursively $N:F5"8F$S=P$7!"$=7F%G%/%j%a%s%H$+$iJC
$F$$$k!#6qBNE*KO<!NDLj!#

```
(+ number (triangle-recursively (1- number)))
```

Emacs $,$3$N#S<0$rI>2A9k;~$O!"$^$::G$bFbIt$N#S<0$+$iI>2A$7$F$$$-!"=g$KB>$NItJ,$rI>2A$7$F$$$
7/=q$/$H<!Nh$&$J%9%F%C%WrF''3HKJ$k!#

Step 1 :G$bFbIt$N#S<0$NI>2A!#
:#$N>l9g!":G$bFbIt$N#S<0$O (1- number) JN$G!" Emacs $O number $r 2 $+$i 1 $K8:$i$9!#

Step 2 triangle-recursively 4X?t$NI>2A!#
3N4X?t$,<+J,<+?H$NFbIt$K4^$^lF$$$k3HHO4X78J/!" Emacs $O Step 1 $N7k2L$r3N4X
$N0z?t$H7FEO$9!#
:#$N>l9g!" Emacs $O triangle-recursively $r0z?t 1 HHbKI>2A9k!#5C$-8+$?h&
$K!"$3$N>l9g$3$N4X?t$O 1 rJV9!#

Step 3 number NCMNI>2A!#
$3$3$G$$$&JQ?t number $O + $G;O$^$k%j%9%H$NFsHVL\$NMWAG!#$=$NCM$O 2 G"$k!#

Step 4 + <0$NI>2A!#
+ <0OFsD$N0z?t$r<u$1<h$k!#0l$DL\$O number $rI>2A$7FJV5l?CM (Step 3) G"$j!"Fs$DL
$O triangle-recursively $rI>2A$7FJV5l?CM (Step 2) G"$k!#
B-$7;;$N7k2L$O 2 $H 1 NOBG$"$j!" 3 $,JV$5lk!#3l$O@5$7$$7k2LG"$k!#Fs9T$+iJ$k;03
NCfK$O>.@P$O 3 8D4^$^$l$k!#

0z?t **3** $N>l9g

triangle-recursively $,0z?t 3 HHbK8F$S=P$5l?H9$k!#

Step 1 *do-again-test* $NI>2A!#
$^$:$O if <0$,I>2A5l$k!#$3lO do-again-test G"$j!"56$,JV5l$k!#=>$C$F!" if <0$N else-
part $,I>2A$5lk!# (3NNcGO!"%F%9%H$N7k2L$,??$N;~$GOJ$/56$N;~$K<+J,<+?H$r:F5"8F$
$7$9k3HKCm0U7h$&!#)

Step 2 *else-part* NbCH$bFbIt$N#S<0$NI>2A!#

else-part $N:G$bFbIt$N#S<0$,I>2A5l!" 3 $, 2 $K%G%/%j%a%s%H$5lk!#3l$, next-step-expression G"$k!#

Step 3 **triangle-recursively** 4X?t$NI>2A!#

?tCM 2 $, **triangle-recursively** 4X?tKEO5lk!#

A0@a$G@bL@$7$?DL$j!" **triangle-recursively** $O0z?t 2 HHbKI>2A5lkH 3 rJV9NG $"$C$?!#

Step 4 B-$7;;$NI>2A!#

B-$7;;$N<0GO 3 $,$3$N;~$N **number** $NCM 3 $K2C$(il$k!#

A4BNH7$F!"$3$N4X?t$,JV$9CM$O 6 KJ$k!#

0J>e$G **triangle-recursively** $K0z?t 3 $rM?$(kHI&Jk$+$,J,C?!#bO$d0z?t$, 4 $N>l9g$K2?$,5
$-$k$+$OL@i+G"m&!#<!Nh$&$J46$8$@!#

:F5"8F$S=P$7$G

```
(triangle-recursively (1- 4))
```

$,I>2A$5$l!"7k2L$H7F

```
(triangle-recursively 3)
```

NCMrJV$9!#$3lO 6 G"$j!"$3NCMK;09TL\$NB-$7;;$G 4 $,2C$(il$k!#

A4BNH7F3$N4X?t$,JV$9CM$O 10 KJ$k!#

triangle-recursively $,I>2A$5lk4H$K!"$h$j>.$5$$0z?tHHbK<+J,<+?H$rI>2A$7!"$=$N>u67$,!"
?t$,$bOd:F5"8F$S=P$7$r5/$3$5$J$$Dx>.5/Jk$^$GB3$1$ilk$H$$$&o1G"$k!#

11.2.3 cond $r;H$C$?:F5"$NNc

0JA0@bL@7?%P!<%8%g%s$N **triangle-recursively** $OFC<l7A<0 **if** $rMQ$$$F=q$+$l$F$$$?!#3l$O **cond** $F
8FPl$kFC<l7A<0$rMQ$$$F$b=q$/3H$,=PMh$k!#FC<l7A<0 **cond** $NL>A0$O **conditional** $H$$$&C18l$NC;=L7
iMhF$$$k!#

FC<l7A<0 **cond** $O Emacs Lisp GO **if** $[$IIQHK$K;H$olF$$$kHO8@$($J$$$,!"$3$3$G@bL@$9$k2ACM$,$
DxEYKO;Hol$F$$$k!#

cond <0$N%F%s%W%l!<%H$O<!NDLjG"$k!#

```
(cond
 body...)
```

$3$3$G *body* $O%j%9%H$NNsG"$k!#

K\BN$NCf?H$rbC$H>\$7$/=q$/$H<!$Nh&$J46$8KJ$k!#

```
(cond
 ((first-true-or-false-test  first-consequent)
  (second-true-or-false-test  second-consequent)
  (third-true-or-false-test  third-consequent)
  ...)
```

Lisp %$%s%?%W%j%?$, **cond** <0$rI>2A$9$k;~$O!"$^$: **cond** $NK\BN$N#S<0NNsN:G=i$N#S<0$N:G=i$NMWAG (C
D^$j??56%F%9%H$NItJ,) $+$iI>2A9k!#

b7!"??56%F%9%H$, **nil** rJV7$?Ji!"$=$N<0$N;DjNItJ, (3l$r7k2LIt (consequent) $H8F$\$&) $C
%-%C%W5l$F!"<!$N#S<0$N??56%F%9%H$,I>2A5l$k!#$3$&$7$F!"$b7"$k#S<0$G??56%F%9%H$, **nil** 0J30$N
7?Ji!"$=$N#S<0$N7k2LIt$,I>2A5l$k!#7k2LIt$O0lDG$bJ#?t$G$b9=$o$J$$!#J#?t$N>l9g$O3F!9$N<0$

2A5l$F$$$-!":G8eNCM,JV5l$k!#$b7=$N#S<0$,7k2LIt$r;}$?J1lP!"??56%F%9%H$N7k2L$,JV5l$
Cp!’$=$7$F!"??56%F%9%H$,??G"C?#S<00J9_$OL5;k$5lk!#)

IN#S<0$N??56%F%9%H$b56rJV7$?>l9g$O **cond** <0$O **nil** rJV9!#

cond $r;H$C$F=q$/$H!" **triangle** 4X?t$O<!Nh$&$KJk!#

```
(defun triangle-using-cond (number)
  (cond ((<= number 0) 0)
        ((= number 1) 1)
        ((> number 1)
         (+ number (triangle-using-cond (1- number))))))
```

3NNcGO!" **cond** $O number $, 0 0J2<$N>l9g$O 0 rJV7!" 1 $N>l9g$O 1 rJV7!" 1 hjBg$-$$>l9g$O (+ number (triangle-using-cond (1- number))) $,I>2A$5lk!#

11.3 %k!<%WKD$$$F$NN}=,LdBj

- 3F!9$N9T$NCM$,9THV9f$N<+>hG"kh$&$J>l9g$K!" **triangle** 4X?t$HF1MM$J4X?t$r=q$-$J$5$$!#$?$@
  while %k!<%W$r;H$&3H!#
- **triangle** 4X?t$HF1MM$@$,!"3F!9$N9TNCMrB-9NGOL5$/!"3]$1$F$$$/h&$J4X?t$r=q$-$J$5$$!#
- >eNFsD$N4X?t$r:F5"E*$J4X?t$K=q$-D>$7J5$$!#$^$?!" **cond** $r;H$C$F=q$-D>7J$5$$!#
- Texinfo %b!<%IN?aK!"%Q%i%0%i%UNCfK4^$^$l$kA4$F$N ‘**@dfn**’ KBP9$k:w0z$N9‘L\$r$=$N%Q%i%0%
  $N:G=i$K:n@.9kh&$J4X?t$r=q$-$J$5$$!# (Texinfo %U%!%$%k$G$O!" ‘**@dfn**’ $,Dj5A$N0uKJCF$$$k!
  7/$O “Indicating Definitions, Commands, etc.” in *Texinfo, The GNU Documentation Format*,
  ;2>H!#)

12 @55,I=8=$N8!:w

GNU Emacs NCfG$O!"@55,I=8=$N8!:w$,E0DlE*$K3hMQ5l$F$$$k!#Nc$($P!" **forward-sentence** H+
forward-paragraph $H$$$C$?4X?t$rD4YF$_$l$P!"$3$&$$$C$?8!:w$K$D$$$Fh/M}2r=PMhk@m&!#

@55,I=8=$N8!:w$O Section “Regular Expression Search” in *The GNU Emacs Manual*, NCfd Section “Regular Expressions” in *The GNU Emacs Lisp Reference Manual*, NCfG@bL@5l$F$$$k!#3N>O$r=q
$/:]$K$b!";d$OFI<T$,>/$J$/$Hb3lir"$kDxEY$OCNCF$$$k3H$rA[Dj$7$F$$$k!#Bg;v$JE@$O!"@55,I
$&$3HG6qBNE*$JJ8;zNs$=NbN@1GOJ$/!"%Q%?!<%s$r$b8!:w=PMh$k$H$$$&3HG"$k!#Nc$($P **forw**
sentence $N%3!<%I$OJ8 (sentence) $N=*$ojr<($9%Q%?!<%s$r8!:w$7!"$=$N>l=j$K%]%$%s%H$r0\F0$9$k!#

<B:]$K **foward-sentence** 4X?t$N%3!<%I$r8+$kA0$K!"J8$N=*$ojr<($9%Q%?!<%s$,IsJbNG$"$kY-$
9M$($F$*$$$?J}$,NI$$$@m&!#3N%Q%?!<%sKD$$$F$O<!$N%;%/%7%g%s$G5DO@$9k3HK9k!#$=$N<!$K!
8=$N8!:w$r9T$&4X?t$G$"$k **re-foward-search** $N@bL@$r9k!# **forward-sentence** 4X?t$N@bL@$O$=$N8eG"
$k!#$3$N>O$N:G8e$N@a$G$O!" **foward-paragraph** 4X?t$N@bL@$r9k!# **foward-paragraph** $OJ#;($J4X?tJN
$G!"4v$D$+?7$7$$FCD'$r>R2p$9k3HKJk!#

12.1 sentence-end $N@55,I=8=

%7%s%\%k **sentence-end** $OJ8Kv (LuCp!’$3$3$G$OL^O@1Q8l$NJ8>O$rA[Dj$7$F$$$k!#) $r<($9$"$k%Q%?!<%s$
%$%s%I$5lF$$$k!#3N@55,I=8=OI$&$"kY$-$@m&$+!)

L@i+$K!"J8Kv$K$O=*;_Id$+5?LdId!"b7$/$O46C2Id$,Mh$k!#<B:]!"3N;0DNJ8;zNCfN0lDG=*N;$9
$@$1$,J8Kv$H8+Jo5lkY$-$G$"$k!#3l$O%Q%?!<%s$NCf$K<!$NJ8;z=89g$,4^$^lk$H$$$&3H$@!#

```
[.?!]
```

7+7J$,$i!" **forward-sentence** $,C1$K=*;_Id$d5?LdId!"46C2Id$K0\F0$9$k$H$$$&$@$1GO$^$:$$!#$
$&$N$b!"$3li$NJ8;z$OJ8CfKb;Holk3H,$"$k$+$iG"$k!#Nc$($P=*;_Id$ON,8l$N8e$K$b;H$olk
$F!"B>$N>pJsbI,MWKJk!#

47=,E*$K!"IaDLJ8Kv$KOFsD$N6uGr$rBGD,!"J8Cf$N=*;_Id!"5?LdId!"46C2Id$N$N8e$K$O0l$D$N6uGr$7$
$$!#=>CF!"=*;_Id!"5?LdId!"46C2Id$KB3$$$FFsDN6uGr$H$$$&N,J8Kv$NNI$$L\0uKJk@m&!#$?$@$
%$%k$NCfGOFsDN6uGr$O%?%V$d9TKvG"CF$bNI$$!#D^$j!"@55,I=8=$NCfKO!"3l$i;0$DNIl+$
N,4^$^$l$k!#$3$NItJ,$O<!Nh$&$K=q1k!#

```
\\($\\| \\|  \\)
       ^    ^^
      TAB  SPC
```

$3$3$G ‘$’ $O9TKv$rI=o9!#$=$l$H!"%?%V$HFsDN6uGr$,$3$NI=8=$NCf$KF~$C$F$$$k3H$r;XE&$7F*$/!#
$b!"$3$NI=8=$NCf$K<B:]$NJ8;z$,A^F~$5lF$$$k!#

3g8L$d=DK@$NA0KOFsDN%P%C%/%9%i%C%7%e ‘\\’ $,I,MW$KJk!#:G=i$N%P%C%/%9%i%C%7%e$O!" Emacs $N
$=$N8e$KB3$/%P%C%/%9%i%C%7%e$r quote 9k$?$aNbNG$"$j!"FsHVL\$N%P%C%/%9%i%C%7%e$O!"$=$N8e$KE
8L$d=DK@$,FC<lJ8;zG"k3Hr<(9bNG$"$k!#

$^$?!"J8$N8e$K$O<!$Nh&$K0l$D0J>e$NI|5"%3!<%I$,B3$/$3Hb$"$k!#

```
[
]*
```

%?%V$d6uGr$HF1MM!"I|5"%3!<%I$b<B:]$N%3!<%IrKda9~$‘$3HG@55,I=8=NCfKA^F~5l$k!#KvHx$N%"%9%
$O!" RET $,Nm2s0J>e7+$jJV$9$3Hr<($9!#

$?$@!"J8Kv$,I,$:7b=*;_Id$d5?LdId!"$J$$$7$O46C2Id$KB3$$$F6uGr$G=*$C$F$$$kHO8BiJ$$!#JD0zM
i+$NJD3g8L$,6uGr$NA0$KMhk+b7lJ$$!#<B:]$N=j!"$3Nh$&$J5-9f$,6uGr$NA0KFsD0J>eB3$/$3H
3liN$?$a$K!"<!$Nh&$JI=8=$,I,MWKJ$k!#

```
[]\"')}]*
```

3NI=8=NCfG!":G=i$N ‘]’ $,:G=i$KMh$F$$$k3H$KCm0U$7h&!# (LuCp!’ ‘[’ $H ‘]’ $G69$sGDja$kJ8;z
NCfK ‘]’ $r4^$akK$O!"$3Nh$&$KJ8;z=89g$N:G=i$K ‘]’ $r5-=R$9$k!#) $^$?!"FsHVL\$NJ8;z$O ‘"’ G"$k
$N ‘\’ $O Emacs K3l,FC<lJ8;zGOJ/J8;zNs$N0lIt$@HEA(k?aNbNG"$k!#;D$j$N;0J8;z$O!"
‘)’!" ‘}’ $=$NbN$rI=$o$9!#$3li$NJ8;z$,Nm2s0J>e8=lk$H$$$&3HKJ$k!#

3l$iA4$F$r9g$;$?$bN,!"$"$kY-J8Kv$N@55,I=8=$r7A@.7F$$$k!#$=$7$F!"<B:]$K **sentence-end** $r
7F$_$k$H!"<!$Nh&JCM,JV5l$k!# (LuCp!’ Mule $d Nemacs GO!"3l$K2C$($FF|K\8lN?aN3HD%
5l$F$$$kNG!"99$KJ#;($KJC$F$$$k!#)

```
sentence-end
     ⇒ "[.?!][]\"')}]*\\($\\|      \\|  \\)[
]*"
```

12.2 4X?t re-search-forward

The **re-search-forward** 4X?t$O!" **search-forward** 4X?t$HHs>o$Kh/;w$F$$$k!# (8e<TKD$$$F$O!"
Section 8.1.3, “4X?t **search-forward**”, p. 65, ;2>H!#)

re-search-forward $O@55,I=8=$r8!:w9k$?$aNbNG$"$k!#b78!:w$,@.8y$9lP!"$?$@AKL\E*H
J8;z$N8e$K%]%$%s%H$r0\F0$9$k!#8eJ}8!:w$N>l9g$OL\E*$NJ8;z$ND>8e$K0\F0$9$k!#8!:w@.8y;~$K$O **re-sea**
forward $O **t** rJV9!# (LuCp!’ Emacs version 19 GO%]%$%s%H$N0LCVrJV9!#) (=>CF!"%]%$%s%H$N0\F0$
!VI{:nMQ!WG"$k!#)

search-forward $HF1$8$/ **re-search-forward** 4X?t$b;M$D$N0z?t$r;}$D!#

1. :G=i$N0z?t$O!"8!:w9k@55,I=8=G"$k!#@55,I=8=$O0zMQId$K0O$^l?J8;zNsGJ1lPJiJ$$!#
2. FsHVL\$N0z?t$O>JN,2DG=$G$"$j!"4X?t$,8!:w$9$kHO0O$r@)8B9k$?$a$KMQ$$$k!#3l$O%P%C%U%!$NCf
   H7$F;XDj$5lk!#
3. ;0HVL\$N0z?t$b>JN,2DG=$G!"8!:w$K<:GT$7$?>l9g$N5sF0$r7h$ak?aNbNG"$k!#$b$70z?t$, **nil**
   <:GT;~KO%(%i!<$,JV$5$l!"%a%C%;!<%8$,I=<(5l$k!#B>$NCM$N>l9g$O<:GT;~KO **nil** $,JV$j!"@.8y;
   t$,JV$5lk!# (LuCp!’ Emacs version 19 GO%]%$%s%H$N0LCV$,JV$5lk!#)
4. ;MHVL\$N0z?t$O7+$jJV7N2s?tG"$k!#Ii$N0z?t$rM?$(kH!"8eJ}8!:wKJ$k!#

re-search-forward $N%F%s%W%l!<%H$O<!NDLjG"$k!#

(**re-search-forward** "*regular-expression*"
limit-of-search
what-to-do-if-search-fails
repeat-count)

FsHVL\$+$i;MHVL\$^GN0z?t$O>JN,2DG=$G$"$k!#7+$7!":G8e$NFsDNJRJ}$J$$$7$ON>J}$KCMrEO7$?
$O!"$=$l0JA0$NA4FN0z?t$rM?$(J1lPJi$J$$!#$=$&7J$$$H Lisp %$%s%?%W%j%?$OIN0z?t$r2?=h$X
$r4V0c$(F7$^$&!#

forward-sentence 4X?tGO!"@55,I=8=$OJQ?t **sentence-end** NCMG$"$k!#D^$j!"<!$NDLjG$"$k!#

```
"[.?!][]\"')}]*\\($\\|  \\|  \\)[
]*"
```

8!:w$N8B3&$O%Q%i%0%i%U$N=*$oj^GG$"$k (J8$,%Q%i%0%i%U$r1[$($FB3$/$3HO$J$$$N$G)!#8!:w$K<:GT$
$O **nil** $,JV$5lk!#$^$?!"7+jJV7$N2s?t$O **forward-sentence** $N0z?t$H7FM?$($ilk!#

12.3 forward-sentence

%+!<%=%k$rJ8$NA0J}$K0\F0$9$k%3%^%s%I$O!" Emacs Lisp GN@55,I=8=8!:w$N;H$$J}$r%9%H%l!<%H$K@bL@
$/$l$k!#$3$N4X?t$O!"<B:]0J>e$KD9$/$FJ#;($=$&$K8+$($k$,!"$=lO!"A0J}$K8!:w$9k@1GOJ$/8eJ}$

=PMhkh$&$KJC$F$$$?$j!"%*%W%7%g%s$H7FJ#?t$NJ8$r0\F0$9$k3H$,=PMh$kh&KJCF$$$k$?$aG
$N4X?t$ODL>o$O M-e $H$$$&%-!<$K%P%$%s%I5l$F$$$k!#

0J2<$, forward-sentence $N%3!<%I$G$"$k!#

```
(defun forward-sentence (&optional arg)
  "Move forward to next sentence-end.  With argument, repeat.
With negative argument, move backward repeatedly to sentence-beginning.
Sentence ends are identified by the value of sentence-end
treated as a regular expression.  Also, every paragraph boundary
terminates sentences as well."
  (interactive "p")
  (or arg (setq arg 1))
  (while (< arg 0)
    (let ((par-beg
           (save-excursion (start-of-paragraph-text) (point))))
      (if (re-search-backward
           (concat sentence-end "[^ \t\n]") par-beg t)
          (goto-char (1- (match-end 0)))
        (goto-char par-beg)))
    (setq arg (1+ arg)))
  (while (> arg 0)
    (let ((par-end
           (save-excursion (end-of-paragraph-text) (point))))
      (if (re-search-forward sentence-end par-end t)
          (skip-chars-backward " \t\n")
        (goto-char par-end)))
    (setq arg (1- arg))))
```

QC$H8+$?$@$1$@$H!"3N4X?t$OD9$/46$8$F7^$&!#$^$:$O9|AH$_$r8+$F!"$=l+iFyNItJ,$r8+$F$$$/
L@$@$m$&!#9|AH$_$r8+$kKO!"7e$,:8$K$"$kbN$+$i8+$F9T$1$PNI$$!#

```
(defun forward-sentence (&optional arg)
  "documentation..."
  (interactive "p")
  (or arg (setq arg 1))
  (while (< arg 0)
    body-of-while-loop
  (while (> arg 0)
    body-of-while-loop
```

3&=q$-D>$9H0CH2rjd9/Jk!#3N4X?tDj5A$O@bL@J8;zNs$H interactive <0!"$=$7$F or <0
while %k!<%W$+$iJC$F$$$kNG$"$k!#

GO=g$K3F!9$NItJ,$r8+$F$$$/3HK7h&!#

$^$:!"@bL@J8;zNs$,2aITB-$J$/$+$DM}2r$7d9$/=q$+lF$$$k3H$KCm0U$7h&!#

3N4X?t$O interactive "p" @k8@$r;}CF$$$k!#3l$O!"($b$7M?$(il$?$J$i) =hM}$5l?A0CV0z?t$,0
H7F3$N4X?t$KEO5lk3Hr0UL#9k!#(3l$O?tCM$G$"$k!#) b7$3$N4X?t$,0z?t$rEO5lJ1lP (
>JN,2DG=G"$k) $=$N>l9g!"0z?t arg $O 1 $K%P%$%s%I5l$k!#$^$?!" forward-sentence $, non-interactive
$K0z?tL5$7$G8F$Pl?>l9gKO!" arg $O nil $K%P%$%s%I5l$k!#

A0CV0z?t$r07$&NO or <0G"$k!#$3$N<0$G$O!" arg NCM,$"kCMK%P%$%s%I5l$F$$$k>l9gO=N^$
F*$-!"$b$7 nil $K%P%$%s%I5l$F$$$?>l9g$O 1 $K%;%C%H$7$F$$$k!#

while %k!<%W

or <0$N8e$K$O!"Fs$D$N while %k!<%W$,B3$/!#:G=i$N while %k!<%WKO!"A0CV0z?t$,Ii$NCMJi$P??$rJV$
$&$J??56%F%9%H$,4^$^lF$$$k!#3l$O8eJ}8!:w$N$?$aNbNG$"$k!#3N%k!<%W$NK\BN$OFsHVL\$N whil
%W$NK\BN$H$=$C$/$jG"k,A4$/F1$8GO$J$$!#<h$j4:$($:$3Ai$NJ}$OHP7F!"FsHVL\$N%k!<%W$NJ}$
k3HK7h$&!#

FsHVL\$N while %k!<%W$O%]%$%s%H$rA0J}$K0\F0$9$kbNG"$k!#9|AH$_$O<!$NDLjG$"$k!#

```
(while (> arg 0)            ; ??56%F%9%H
  (let varlist
    (if (true-or-false-test)
        then-part
      else-part
  (setq arg (1- arg))))     ; while %k!<%W$N%G%/%j%a%s%?
```

3N while %k!<%W$O%G%/%j%a%s%H%?%$%W$NJ*$G$"$k (Section 11.1.4, "8:>/%+%&%s%?$r;H$C$?%k!<%W", p. 88
;2>H)!#3NCfKO%+%&%s%? (:#$N>l9g$OJQ?t arg) $,Nm$hjbBg$-$$4V$O??$rJV9h$&$J??56%F%9%H$,4^$^$
$k!#$=7F!"%k!<%W$r7+$jJV$9$4HK%+%&%s%?NCMr 1 8:i9h&$J%G%/%j%a%s%?$,4^$^$l$F$$$k!#

b7 forward-sentence $KA0CV0z?t$,M?$($ilJ$+$C$?$J$i!"$H$$$CFb3l$,IaDL$N;H$$J}$@$,!"$=$
9g while %k!<%W$O01EY$@$17+$jJV$9!#$3lO arg NCM, 1 $@$+iG$"$k!#

while %k!<%W$NK\BN$O let <0$+$iJk!#3l$O6I=jJQ?t$r:n@.9k!#$^$?!"$=$NK\BN$H$7$F if <0$r;}$C
$k!#

while %k!<%W$NK\BN$O<!Nh$&$G$"$k!#

```
(let ((par-end
       (save-excursion (end-of-paragraph-text) (point))))
  (if (re-search-forward sentence-end par-end t)
      (skip-chars-backward " \t\n")
    (goto-char par-end)))
```

$3$3$G let <0$O6I=jJQ?t par-end $r@8@.!"%P%$%s%I7F$$$k!#3N8e8+kh$&$K!"3N6I=jJQ?t$O@55,
8!:w$K8B3&$J$$$7$O@)8B$rM?$($k$?$a$KMQ$$$ilF$$$k!#b7$3$N8!:w$G%Q%i%0%i%UFb$KE,@Z$JJ8Kv$,8+$
1l$P%Q%i%0%i%U$N=*C<$G8!:w$rda$k!#

$,!"$=$NA0$K$^$:I&dC$F par-end $,%Q%i%0%i%U$N=*C<NCMK%P%$%s%I$5lk$+$r8+F_h&!#3
let <0$r;H$C$F!"<!$N#S<0$r Lisp %$%s%?%W%j%?$,I>2A$7$?:]$KJV5lkCMK par-end NCMr%;%C%H7F$$$

```
(save-excursion (end-of-paragraph-text) (point))
```

3N<0GO (end-of-paragraph-text) KhCF%]%$%s%H$,%Q%i%0%i%U$K0\F0$7!" (point) KhCF$=$N
%]%$%s%H$NCM$,JV$5lk!#$=$7$F!" save-excursion KhCF85$N0LCV$K%]%$%s%H$,La5lkH$$$&o1$
$k!#$3Nh$&$K7F let $O par-end $K save-excursion<0$,JV$9CM!"$D$^$j%Q%i%0%i%U$N=*C<$N0LCV$r%P%
%s%I9k!# (end-of-paragraph-text 4X?t$O forward-paragraph $r;H$C$F$$$k!#3lKD$$$F$O8e$G4J
C1$K?($l$k!#)

Emacs $O<!$K let <0K\BN$NK\BN$rI>2A9k!#3l$O<!$Nh&$J if <0$G$"$k!#

```
(if (re-search-forward sentence-end par-end t) ; if-part
    (skip-chars-backward " \t\n")              ; then-part
  (goto-char par-end)))                        ; else-part
```

if $O:G=i$N0z?t$,??$+I&$+%F%9%H$7!"b7??Ji then-part $rI>2A$7!"$=$&GJ1l$P else-part $rI>
9k!#:#$N>l9g if $N??56%F%9%H$O@55,I=8=8!:wG"$k!#

forward-sentence Nh$&$J4X?t$N<B:]$NF0:n$O4qL/$K46$8$ilk$+$b7l$J$$!#7+$7 Lisp GO3N
$&$JA`:n$,9T$olkNO!"4/0lHLE*J3HG$"$k!#

@55,I=8=$N8!:w

re-search-forward 4X?t$OJ8Kv!"$D$^$j@55,I=8= sentence-end$GDj5A$5l?%Q%?!<%s$r8!:w$9$k!#$b$7
%Q%?!<%s$,8+$D$+$C$?$J$i — B($AJ8Kv$,8+$D$+$C$?$J$i — $=$N;~$O re-search-forward 4X?t$OFsDN$3
$r9T$&!#

1. re-search-forward 4X?t$OI{:nMQ$r<B9T9k!#B($A!"%]%$%s%H$r8+$D1?J8Kv$^$G0\F0$9$k!#
2. re-search-forward 4X?t$O??$NCMrJV9!#3l$O if KhCFJV5lkCMG$"$j!"8!:w$,@.8y7?3H
   0UL#9k!#

I{:nMQH7FN%]%$%s%H$N0\F0$O if 4X?t$,8!:w@.8y$N7k2L$H7FCMrJV9hj$bA0$N;~E@$K9T$olk!#

if 4X?t$,8!:w$K@.8y7? re-search-forward $+$i8F$S=P$5lF??NCMrJV$9:]$K$O if $O then-part!"B(
$A (skipo-chars-backward "\t\n") $NI>2A$b9T$&!#$3$N#S<0$O%?%V$d2~9T$JIr4^$`A4$F$N<oN`$N6uGrJ8
;z$r1[$($F!"L\$K8+$($kJ8;z (printed character) $N=j$^$GA0$KLa$j!"$=$NJ8;z$ND>8e$K%]%$%s%HrCV/!#%
%s%H$O4{$KJ8Kv$N%Q%?!<%s$N=j$^$G0\F0$7$F$$$kNG!"3NF0:n$GJ8$,L\$K8+$($kJ8;z$G=*$oCF$$$kItJ
KMhk3HKJ$k!#DL>o$O%T%j%*%I$@$m$&!#

0lJ}!"b7 re-search-forward 4X?t$,J8Kv%Q%?!<%s$r8+D1ilJ+C?>l9gKO!"4X?t$O56$rJV$9!#
$N>l9g$O if $O;0HVL\$N0z?t$rI>2A$9$k!#$3lO (goto-char par-end) G"$k!#$3lO paragraph $N=*$o
jK$^$G%]%$%s%H$r0\F0$9$k4X?tG"$k!#

@55,I=8=8!:w$O6K$a$FJXMx$JbNG"$j!" forward-sentence — $=$NCfGO8!:w$O if <0$N%F%9%HKJ$C
$$$k — $G@bL@$5l?%Q%?!<%s$O<j7Z$K;H$($kbNG"$k!#$"J?b3$N%Q%?!<%s$r<h$jF~$l$?%3!<%I$r8+
$$$?j9kG$"$m$&!#

12.4 forward-paragraph: 4X?t$N6bL.

forward-paragraph 4X?t$O%]%$%s%H$r%Q%i%0%i%U$N=*oj$^$G0\F0$9$k!#3l$ODL>o M-} $K%P%$%s%I$5
F*$j!"Nc$($P let*!" match-beginning!" looking-at Nh$&$J$=$l<+?H$b=EMW$G$"$kh&$JB>$N4vD+$N
4X?t$rMxMQ$7$F$$$k!#

forward-paragraph 4X?t$NDj5A$O forward-sentence 4X?t$NDj5A$KHfYF$+$J$jD9$$!#3l$O3F!9$N9T
$, fill-prefix (9T5M$a@\F,<-) $G;O$^kh$&$J%Q%i%0%i%U$bAj<j$K7J1lPJiJ$$$?aG$"$k!#

Fill prefix $O 3F!9$N9T$N@hF,$K7+jJV78=lkJ8;zNs$+$iJk!#Nc$($P Lisp %3!<%IGOJX59>e%Q%i%0%i%
3F!9$N9T$, ';;; ' $+$i;O$^$k!#$^$?%F%-%9%H%b!<%IGO;MDN6uGrJ8;z%$%s%G%s%H$5l?%Q%i%0%i%U$N fill p
H7Fh$/;H$olk!# (Fill prefix KD$$$FNh$j>\$7$$>pJs$O Section "Fill Prefix" in *The GNU Emacs Manual*, $r;2>H$;$h!#)

Fill prefix $,$"kH$$$&3H$O!" forward-paragraph 4X?t$O!"Cf$N9T$,:8C<$+$i;O$^CF$$$kh&$J%Q%
%0%i%U$N=*$ojr8+D1k@1GOJ$/!"$=$N%P%C%U%!$NA4$F!"$J$$$7$OB?$/$N9T$,$"$k fill prefix $G;O$^$
kh$&>l9g$K$b%Q%i%0%i%U$N=*oj$r8+$D1J1lPJiJ$$$H$$$&3H$r0UL#$9$k!#

99$K!";~$K$O fill prefix $,$"CF$bL5;k$7$?J}$,NI$$>l9g$@$CF"$k!#FC$K6u9T$G%Q%i%0%i%U$,6h@Zil
kh$&$J>l9gJs$+$@!#3lKh$j99$KJ#;(5,A}$($k!#

$3$3GO forward-paragraph 4X?t$rA4$F=q$-=P$9NOda$F!"$=NCfN0lIt$@$1$r8+$k3HK9$k!#=
J7KFIb$&$H9k$H!"$AgC$H22$7F7$^$&$+$b7l$J$$!#

3N4X?t$N%"%&%H%i%$%s$O<!$Nh&G"$k!#

```
(defun forward-paragraph (&optional arg)
  "documentation..."
  (interactive "p")
  (or arg (setq arg 1))
  (let*
      varlist
    (while (< arg 0)        ; 8eJ}$K?J$`>l9g$N%3!<%I
      ...
      (setq arg (1+ arg)))
    (while (> arg 0)        ; A0J}$K?J$`>l9g$N%3!<%I
      ...
      (setq arg (1- arg)))))
```

4X?t$N:G=i$NItJ,$O$$$DbNDLjG$"$k!#0z?t$N%j%9%H$K$O01$D>JN,2DG=$J0z?t$,$"$k$@$1G"$k!#<!$
;zNs$,B3$/!#

%$%s%?%i%/%F%#%V@k8@$NCf$N>.J8;z$N 'p' Ob$7A0CV0z?t$,$"$l$P!"$=lr=hM}7F$+$i4X?tKEO9$3$H
9k!#3l$O?tCM$G$"$j!"$$$/$DJ,$N%Q%i%0%i%U$r0\F0$9k+$rI=$o$9!#<!$N9T$N or <0$O4X?t$K01$D$b0z
$($ilJ$+$C$?>l9g$r07$&$?aNJ*G"$k!#$3lO3N4X?t$,%$%s%?%i%/%F%#%VGOJ/B>$N%3!<%I$+$i8
l?>l9g$K5/$-$k!#$3lK$D$$$F$O0JA0@bL@$7$?!# (Section 12.3, "forward-sentence", p. 96, ;2>H!#) $3$3
$^$G$O!":#$^$G47$l?F7sG-$?ItJ,$G$"$k!#

let* <0

forward-paragraph $N<!$N9T$O **let*** <0$G;O$^$k!#3l$O0JA0$K=PF?<0HO0[Jk!#3N%7%s%\%k$
let* G"CF **let** GO$J$$!#

FC<l7A<0 **let*** $O4pK\E*$K **let** $HF1$8JN$@$,!" Emacs $,JQ?t$r=g$K%;%C%H$7$F$$$/$?$a!"JQ?t%j%9%H$
$G8e$K=PF/$kJQ?t$,$=$l0JA0$K=P$F$-$?JQ?tNCMr;2>H9k3H$,=PMh$k!"$H$$$&E@N_$,0[$JCF$$$k

3N4X?t$N **let*** <0$NCfGO Emacs OFsD$NJQ?t **fill-prefix**$H **paragraph-separate** $r%P%$%s%I$7
$F$$$kN@$,!" **pargraph-separate** $,%P%$%s%I5lkCMO **fill-prefix-regexp**NCMK0MB8$7$F$$$kNG
$"$k!#

3F!9$r=g$K8+$F$$$3$&!#%7%s%\%k **fill-prefix-regexp** $O<!$N%j%9%H$rI>2A$7$?CM$K%;%C%H5l$k!#

```
(and fill-prefix
     (not (equal fill-prefix ""))
     (not paragraph-ignore-fill-prefix)
     (regexp-quote fill-prefix))
```

3l$O:G=i$NMWAG$,4X?t **and** G"kh$&$J#S<0G"$k!#

4X?t **and** $O3F!9$N0z?tr=NIl+$, **nil** rJV9$^$GI>2A7F$$$/!#Il$+$, **nil** rJV7$?>l9g$O **and**
nil rJV9!#7+$7!"$b7I$N0z?t$b **nil** rJV5J1$1$P!":G8e$N0z?t$rI>2A7FJV5l$?CM$rJV$9!# ($
9g!"$=$NCM$O nil GO$J$$$N$G!" Lisp GO??$H8+$J5l$k!#) JL$N8@$$J}r9lP!" **and** $O0z?tA4$F$,??$G
>l9gKN$_??$rJV9o1G$"$k!#

:#$N>l9g$J$i!" **fill-prefix-regexp** $O8e$KB3$/;M$D$N#S<0$rI>2A7FA4$F?? (B($A!"Hs **nil**) $,JV$5l
>l9gKN$_!"Hs **nil** NCMrJV$9!#$=$&GJ$$>l9g$O **fill-prefix-regexp** $O **nil** $K%P%$%s%I5l$k!#

fill-prefix
: 3NJQ?t$rI>2A$9kH!"b7$"$l$P fill prefix NCM,JV5l$k!# fill prefix $,L5$$>l9g$O **nil** $,
JV$k!#

(not (equal fill-prefix "")
: 3N#S<0$O fill prefix $,$"C?>l9gK=l,6uJ8;zNs!"D^$jJ8;z$r01Db4^$^$J$$J8;zNs$+$
$+$rH=Dj9k!#6uJ8;zNs$O fill prefix H7FNLrKON)$?$J$$!#

(not paragraph-ignore-fill-prefix)

3N#S<0$O!"$b$7JQ?t paragraph-ignore-fill-prefix $, t Ey$N??NCMK%;%C%H5l$F$$$k >l9g$K nil rJV9!#

(regexp-quote fill-prefix)

3l$O and 4X?t$N:G8e$N0z?t$KJk!#b7 and $NA4$F$N0z?t$,??G"lP!" and NCMH7F 3N#S<0$rI>2A$7FJV5l?CM$,JV$5lk3HKJ$k!#$=7F$=$l$, fill-prefix-regexp NCMK$ $k!#

3N and <0$rI>2A$7$F??$,JV5l$?>l9g!" fill-prefix-regexp$O regexp-quote KhCF=$@5$5l? fill-prefix NCMK%P%$%s%I$5lk!# regexp-quote $O!"J8;zNs$rFI$_<h$j!"$=$lN_$K%^%C%A$7!"$=$N $NJ8;zNs$K$O%^%C%A$7$J$$$h$&$J@55,I=8=rJV9!#7k6I!" fill prefix $,B8:_$9$k>l9g!" fill-prefix-regex O=$N fill prefix NCMKAg$&$I%^%C%A9kCM$K%;%C%H5l!"$=$&$GJ1lP nil $K%;%C%H$5lk!#

let* <0$NFsHVL\$N6I=jJQ?t$O paragraph-separate G"$k!#$3lO<!$N#S<0$rI>2A7FJV5l$?CM$K%P$ %s%I5l$k!#

```
(if fill-prefix-regexp
    (concat paragraph-separate
            "\\|^" fill-prefix-regexp "[ \t]*$")
  paragraph-separate)))
```

3N#S<0$r8+$l$P2?8N let GOJ/ let* <0$r;HC?$+$,J,$k!# if <0$N??56%F%9%H$O!"JQ?t fill-prefi NCM, nil $+$=$NB>$NCM$+$H$$$&3H$K0MB8$7$F$$$kNG$"$k!#

b7 fill-prefix-regexp $,CM$r;}$?$J$+$C$?$J$i!" (LuCp: D^$j nil G"lP) Emacs $O if <0$N else-part $rI>2A$7!" paragraph-separate $r8=:_$N6I=jE*JCMK%P%$%s%I$9$k!# (paragraph-separate $O%Q%i%0%i%U$N6h@ZjK%^%C%A9k@55,I=8=G"$k!#)

7+$7!"$b$7 fill-prefix-regexp $,CM$r;}FP!" (LuCp: ??NCMr;}FP) Emacs $O if <0$N then-part $rI>2A$7!" paragraph-separate NCMr fill-prefix-regexp $r%Q%?!<%s$N0lItH7$F4^$`h&$J@55,I= 8=$K%P%$%s%I$9$k!#

hj>\$7$/8@$&$H paragraph-separate $O!"85!9$N paragraph-separate NCMr fill-prefix- regexp $K6u9T$r2C$($?I=8=$rO"7k$7$?CM$K%;%C%H5lk3HKJk!# '^' $O fill-prefix-regexp $,9TF, KMhJ1lPJiJ$$$3Hr0UL#$7!"$=$N8e$K6uGr$,Mh$F$bNI$$$3H,!"" [\t]*$" $GDj5A$5lF$$$k!# $O!"$3$N@55,I=8=$+85$N paragraph-separate $+$IAi$+$,%^%C%A7J1lPJiJ$$$3Hr<(9bN $k!#

GO let* <0$NK\BNItJ,$KF~m&!#K\BN$N:G=i$NItJ,GO!"3N4X?tKIiN0z?t$,M?$(i?>l9g!"B($A8e F0$9$k>l9g$r07CF$$$k!#3NItJ,$O>JN,$9k3HK9k!#

A0J}$K0\F0$9$k>l9g$N while %k!<%W

let* <0$NK\BN$NFsHVL\$NItJ,$OA0J}$K0\F0$9$k>l9g$r07$C$F$$$k!#3l$O arg $,Nm$hjbBg$-$$4V$O7- 9h$&$J while %k!<%WG"$k!#3N4X?t$r;H$&>l9g$OBgDq3N0z?t$O 1 G"$k!#=>$C$F while %k!<%W$NK\ Ag$&$I0lEY$@$1<B9T5l!"$=$lKh$j%+!<%=%k$O%Q%i%0%i%U$r0l$D$@$10\F0$9$k!#

3N while %k!<%W$O<!$Nh&$J7A$r7F$$$k!#

```
(while (> arg 0)
  (beginning-of-line)

  ;; %Q%i%0%i%U$H%Q%i%0%i%U$N4V$K5o$k>l9g
  (while (prog1 (and (not (eobp))
                     (looking-at paragraph-separate))
           (forward-line 1)))
```

```
;; %Q%i%0%i%UFb$G!" fill prefix $,$"$k>l9g
(if fill-prefix-regexp
    ;; fill prefix $,$"$k$N$G!" paragraph-start $O4X78L5$7!#
    (while (and (not (eobp))
                (not (looking-at paragraph-separate))
                (looking-at fill-prefix-regexp))
      (forward-line 1))
  ;; %Q%i%0%i%UFb$G!" fill prefix $,$J$$>l9g
  (if (re-search-forward paragraph-start nil t)
      (goto-char (match-beginning 0))
    (goto-char (point-max))))

(setq arg (1- arg)))
```

$^$:D>AKJ,k3HO!"3l$O8:>/%+%&%s%?$N while %k!<%WG"$j!"%G%/%j%a%s%?$H7F (setq (1- arg
$H$$$&#S<0$r;H$C$F$$$k$H$$$&3HG"$k!#$3$N%k!<%W$NK\BN$O<!$N;0DN#S<0$+$iJk!#

```
;; %Q%i%0%i%U$N4V$K5o$k>l9g
(beginning-of-line)
(while
    body-of-while)

;; %Q%i%0%i%UFb$G!" fill prefix $,$"$k>l9g
(if true-or-false-test
    then-part

;; %Q%i%0%i%UFb$G!" fill prefix $,$J$$>l9g
  else-part
```

Emacs Lisp $N%$%s%?%W%j%?$, while %k!<%W$NK\BN$rI>2A$9$k>l9g!"$^$::G=i$K (beginning-of-line)
$H$$$&<0$rI>2A$7$F9TF,$K0\F0$9$k!#<!$KFbIt$N while %k!<%W$KF~$k!#3N while %k!<%W$O!"%+!<%=%k$,
%0%i%U$H%Q%i%0%i%U$N4V$N6uGr$K$"$C$?>l9g$K30$K0\F0$5$;$k$?$aNbNG$"$k!#:G8e$K!"<B:]$K%Q%i%0%
jK%]%$%s%H$r0\F0$9$k if <0$,Mh$k!#

%Q%i%0%i%U$H%Q%i%0%i%U$N4VGNF0:n

$^$:$OFbIt$N while %k!<%W$r8+$k3HK7h&!#3N%k!<%W$O%]%$%s%H$,%Q%i%0%i%U$H%Q%i%0%i%U$N4V$
$?>l9g$r07$&$?aNbNG"$k!#$3$3$G$O;0$D$N?7$7$$4X?t$,EP>l$9$k!# prog1!" eobp!"$=7F looking-
G"$k!#

- prog1 4X?t$O progn Hh$/;w$F$$$kN@$,!"0z?t$r=g$KI>2A$7$F$$$C$?8e!":G=i$N0z?t$,JV$7$?CM$
  $N4X?tA4BN$NCMH7$FJV$9!"$H$$$&E@$,0[$JCF$$$k!# (progn 4X?t$O:G8e$N0z?t$,JV$7$?CM$rJV9N
  $?!#) prog1 $NFsHVL\0J9_$N0z?t$OI{:nMQ$@1N$?$a$KI>2A$5lko1G"$k!#
- eobp $O 'End Of Buffer P' $NN,$G$"$j!"%]%$%s%H$,%P%C%U%!$N:G8e$K$"$k>l9g$K??$rJV$94X?t$G$"$k!#
- looking-at $O!"%]%$%s%H$N8e$KB3$/%F%-%9%H$, lookingo-at $N0z?t$H7FM?$($il?@55,I=8=$K%^%
  %A9k>l9g$K??$rJV$94X?t$G$"$k!#

while %k!<%W$O<!$NDLjG$"$k!#

```
(while (prog1 (and (not (eobp))
                   (looking-at paragraph-separate))
              (forward-line 1)))
```

3N while %k!<%W$OK\BNItJ,$r;}$?$J$$!* ??56%F%9%H$O<!$N#S<0G"$k!#

```
(prog1 (and (not (eobp))
            (looking-at paragraph-separate))
       (forward-line 1)))
```

prog1 $N:G=i$N0z?t$O **and** <0$G$"$k!#3NCfKO!"%]%$%s%H$,%P%C%U%!$N:G8e$K$"$k$+$I$&$+!"$=$7$F%]%
$ND>8e$K%Q%i%0%i%U$N6h@Z$j$r<($9@55,I=8=$K%^%C%A$9$k%Q%?!<%s$,$"$k$+$I$&$+$N%F%9%H$,4^$^$l$F$$$k

b7%+!<%=%k$,%P%C%U%!$N:G8eGOJ/!"$^$?%+!<%=%k$N8e$K%Q%i%0%i%U$N6h@Z$j$r<($9J8;z$,$"lP
<0$O??$KJk!# Lisp %$%s%?%W%j%?$O **and** <0$rI>2A$7$?8e!" **prog1** $NFsHVL\$N0z?tG"$k **forward-line** $rI
2A9k!#3l$O%]%$%s%H$r0l9T$@$1A0$K0\F0$9$k!#$?$@$7!" **prog1** $,JV$9CM$O:G=i$N0z?tNCMG$"$k!#=>
while%k!<%W$O%]%$%s%H$,%P%C%U%!$N:G8eKOJ/!"$^$?%Q%i%0%i%U$H%Q%i%0%i%U$N4VK"$k4V$@$17+$j
$k!#:G=*E*$K%]%$%s%H$,$"$k%Q%i%0%i%U$K0\F0$7$?$J$i!" **and** <0$O56rJV9!#$$$:lK7m **forward-line**
%^%s%I$O<B9T$5lk3H$KCm0U$7h&!#3l$O%]%$%s%H$,%Q%i%0%i%U$H%Q%i%0%i%U$N4V$+$i0\F0$7$?>l9g!
%H$O%Q%i%0%i%U$NFs9TL\$N@hF,KCV+lk3HKJk3Hr0UL#7F$$$k!#

%Q%i%0%i%U$NFbIt$G$NF0:n

30B&$N **while** %k!<%W$G$N<!$N#S<0$O **if** <0$G$"$k!# Lisp %$%s%?%W%j%?$O **fill-prefix-regexp** JQ?t$,
nil 0J30NCMr;}CF$$$k>l9gKO **if** <0$N then-part $rI>2A$7!" **nil** $N>l9g!"$D$^$j fill prefix $,L5$$>l9
$O else-part $rI>2A$9$k!#

Fill prefix $,L5$$>l9g

$^$::G=i$K fill prefix $,L5$$>l9g$N%3!<%I$r8+kN$,C1=c$GNI$$$@m&!#3N%3!<%I$O<!$Nh&K^$?JL$
<0$+$iJC$F$$$k!#

```
(if (re-search-forward paragraph-start nil t)
    (goto-char (match-beginning 0))
  (goto-char (point-max)))
```

3N#S<0$O!"BgDq$N?M$, **forward-paragraph** %3%^%s%I$N<gL\E*$H9M$($kG"m&;E;v$r<B:]$K9T$&!#$D$^$
$^$:<!$N%Q%i%0%i%U$N;O$^$j$rA0J}$K8~$+$C$F8!:w$9kh$&$J@55,I=8=$N8!:w$r9T$$!"b78+D+lP!"%
r=$N0LCV$K0\F0$9$k!#JL$N%Q%i%0%i%U$N;O$^$j$,8+$D$+$i$J$$>l9g$O!"8=:_$N%P%C%U%!$G%"%/%;%92DG=$
0LCV$^$G0\F0$9$k!#

3NCf$G!"$3l^GG47$l?F$7sG$$$J$$ItJ,$O **match-beginning** $N;H$$J}$@$1G"$k!#$3$N4X?t<+BN$
aF=PF/kbN@!# **match-beginning** 4X?t$O!":G8e$K9TC?@55,I=8=8!:w$G%^%C%A$7$?%F%-%9%H$N;O$^
0LCV$rI=$o$9?tCM$rJV$94X?t$G$"$k!#

$3$3$G **match-beginning** 4X?t$,;H$olF$$$kNOA0J}8!:w$N@-<A$N$?$aG"$k!#$D$^$j!"A0J}8!:w$,@.8
$?>l9g!"DL>o$N8!:w$+@55,I=8=$N8!:w$+$I$&$+K+$+$oi:!"%]%$%s%H$r8+D1$?%F%-%9%H$N0LCVK^$G0
7^$&!#:#$N>l9gJi!"8!:w$K@.8y$7$?>l9g$O%]%$%s%H$O **paragraph-start** $N%Q%?!<%s$N=*ojK^$G0\
kN$@$,!"3l$O8=:_$N%Q%i%0%i%U$N=*$ojGOJ$/!"<!$N%Q%i%0%i%U$N;O$^jG$"$k!#

7+7J$,$i!"2f!9$NL\E*$O%]%$%s%H$r<!$N%Q%i%0%i%U$N@hF,GOJ/8=:_$N%Q%i%0%i%U$N=*ojK^
9k3HG"$k!#$3NFsD$N0LCV$O!"%Q%i%0%i%U$H%Q%i%0%i%U$N4V$K4v$D$+$N6u9T$,$"$k>l9g$JIG$O!"E
$k!#

0z?t 0 $G8F$Pl?>l9g!" **match-beginning** $O:G$b:G6a!"@55,I=8=$N8!:w$K@.8y7?0LCVrJV9!#:#$N>l9
:G$b:G6a$N@55,I=8=$N8!:w$O **paragraph-start** $rC5$9bNJN$G!" **match-beginning** O=$N%Q%?!<%s$N3+
;O0LCVrJV9!# (=*N;0LCVGO$J$$!#) 3N3+;O0LCV$O%Q%i%0%i%U$N:G8eG"$k!#

($D$$$G$K$$$&$H!"0z?t$H7F@5$N?t$,EO5l$?>l9g!" **match-beginning** 4X?t$O:G8e$N@55,I=8=NCfN3
G/$/$il?ItJ,$NI=8=$N3+;O0LCVrJV9!#3l$OJXMx$J5!G=G"$k!#)

Fill prefix $,$"$k>l9g

5C$-5DO@$7$?!"FbIt$NJ}$N **if** <0$O!"$=$l$r4^$` fill prefix $,$"k+I&$+$r%F%9%H9k **if** <0$N els
part KJCF$$$?NG$"$C$?!# fill prefix $,$"$k>l9g$O!" then-part $NJ}$,I>2A5l$k!#$3$NItJ,$O<!NDLj
$"$k!#

```
(while (and (not (eobp))
            (not (looking-at paragraph-separate))
            (looking-at fill-prefix-regexp))
  (forward-line 1))
```

3N#S<0$,$dk3HO!"<!$N;0$D$N>r7o$,??G"$k4V$@$1!"%]%$%s%H$r0l9T$:$DA0J}$K0\F0$9$k3HG"$k

1. %]%$%s%H$O%P%C%U%!$N:G8e$GOJ$$!#
2. %]%$%s%H$KB3$/%F%-%9%H$O%Q%i%0%i%U$N6h@Z$jGO$J$$!#
3. %]%$%s%H$KB3$/%Q%?!<%s$O fill prefix $rI=$o$9@55,I=8=$G$"$k!#

:G8e$N>r7o$OAgCH8MOG$&$+b7lJ$$$,!"%]%$%s%H$, **forward-paragraph** 4X?tKhCF4{$K9TF,$K0
7F$$$k3H$r;W$$=P$;$PG<F@=PMhk@m&!#D^$j!"%F%-%9%H$K fill prefix $,$"lP!" **looking-at** 4X?t$
lr8+k3HKJkNG$"$k!#

$^$H$a

0J>er^HaF_h&!#A0J}$K0\F0$9$k>l9g$N **forward-paragraph** 4X?t$O<!$N3H$r9T$&!#

- %]%$%s%H$r9TF,$K0\F0$9$k!#
- %Q%i%0%i%U$H%Q%i%0%i%U$N4V$N9T$rHt$P$9!#
- fill prefix $,$"k+I&$+%A%'%C%/$9$k!#$b7"lP!"
  — $=$N9T$,%Q%i%0%i%U$N6h@ZjN9TGJ$$4V$@$1!"0l9T$:$DA0$K?J$`!#
- b7 fill prefix $,$J1l$P!"
  — <!$N%Q%i%0%i%U$N3+;O%Q%?!<%s$r8!:w$9$k!#
  — $=$N%Q%i%0%i%U$N3+;O%Q%?!<%s$N;O$^$j$N0LCV$K0\F0$9$k!#3l$O!"$=$NA0$N%Q%i%0%i%U$N=*N;0
  $"$k!#
  — $=$N%Q%?!<%s$,8+$D$+$i$J$$>l9g$O!"$=$N%P%C%U%!$N%"%/%;%92DG=$J:GBg0LCV$^$G0\F0$9$k!#

I|=,N?aK!"3l$^$G5DO@7F$-$?%3!<%I$r8+$d$9$$$h$&@07A$7$F5s$2F*$/!#

```
(interactive "p")
(or arg (setq arg 1))
(let* (
       (fill-prefix-regexp
        (and fill-prefix (not (equal fill-prefix ""))
             (not paragraph-ignore-fill-prefix)
             (regexp-quote fill-prefix)))

       (paragraph-separate
        (if fill-prefix-regexp
            (concat paragraph-separate
                    "\\|^"
                    fill-prefix-regexp
                    "[ \t]*$")
          paragraph-separate)))
```

backward-moving-code (omitted) ...

```
      (while (> arg 0)                 ; A0J}$K?J$`>l9g$N%3!<%I
        (beginning-of-line)

        (while (prog1 (and (not (eobp))
                           (looking-at paragraph-separate))
                 (forward-line 1)))

        (if fill-prefix-regexp
            (while (and (not (eobp))   ; then-part
                        (not (looking-at paragraph-separate))
                        (looking-at fill-prefix-regexp))
              (forward-line 1))
                                       ; else-part: FbIt$N if
          (if (re-search-forward paragraph-start nil t)
              (goto-char (match-beginning 0))
            (goto-char (point-max))))

        (setq arg (1- arg)))))         ; %G%/%j%a%s%?
```

forward-paragraph 4X?t$N40A4$JDj5A$O!">e$K5s2?A0J}$K?J$`%3!<%I$@$1GJ$/!"8eJ}$KLa$k%3!<%I$
sG$$$k!#

b7!"3NJ8=q$r GNU Emacs NCfGFIsG$$$kJi!"3N4X?tA4BN$N%3!<%I$r8+$?$$>l9gKO **M-.** (**fin
tag**) $H%?%$%W$7!"%W%m%s%W%H$,=P$?$i4X?tL>$r%?%$%W9l$PNI$$!# **find-tag** 4X?t$,$^$: 'TAGS' %F!<%V%k$
A0$rJ9$$$F$-$?>l9g$O!"$"J?$N '**emacs/src**' %G%#%l%/%H%jNCfN 'TAGS' %U%!%$%k$NL>A0rEz($k!#$3$
'**/usr/local/lib/emacs/19.23/src/TAGS**'. Nh$&$J%Q%9L>G"$k!# (@53N$J '**emacs/src**' %G%#%l%/%H%j
$N%Q%9L>$O$"$J$?$N Emacs $,$INh$&$K%$%s%9%H!<%k$5lF$$$k$+$K0M$k!#$b$7%Q%9L>$,J,iJ1l$P!"
H7$F Info $KF~$j!" **C-x C-f** $H%?%$%W7F **emacs/info** %G%#%l%/%H%j$N%Q%9L>$rCNk3H,=PMh$k!# 'TAGS
%U%!%$%k$N%Q%9$OBP1~$9$k '**emacs/src**' %Q%9$G$"$k3H$,B?$$!# (LuCp!'L5$$$3HbB?$$!#) bCHb Info %
%$%k$,B>$N>l=j$K$"$k3H$bB?$$$,!#

0?$$$O!" 'TAGS' %U%!%$%k$,$J$$%G%#%l%/%H%j$K!"<+J,<+?H$N 'TAGS'%U%!%$%k$r:n@.9k3H$b=PMh$k!#

12.5 <+J,<+?H$N 'TAGS' %U%!%$%k$N:n@.

4JC1$K%=!<%9$N>l=j$^$G%8%c%s%W=PMhkh$&$K!"$"$J$?<+?H$N 'TAGS' %U%!%$%k$r:n@.9k3H$,=PMh$k!
$P!"$b7"J?$N '**~/emacs**' %G%#%l%/%H%j$KBt;3$N%U%!%$%k$,$"$C$?$H9k$H — 2?$r1#$=$&!";db3$N>l
137 8D$N '**.el**' %U%!%$%k$,$"$j!"$=$NFb 17 8D$r%m!<%I7F$$$kN@$, — $=$N%G%#%l%/%H%j$K 'TAGS' %U%!%
$r:n$k3H$G!" **grep** d=$NB>$NF;6q$G4X?tL>$r8!:w9khjO:CH4JC1$K!"FCDj$N4X?t$N0LCV$K%8%c%s
3H$,=PMh$kh&KJ$k!#

TAGS %U%!%$%k$O!" Emacs $NG[I[$K4^$^$l$k **etags** %W%m%0%i%`$r;HCF:n@.=PMh$k!#IaDL!" **etags** $
Emacs $,9=C[$5l?;~$K0l=o$K%3%s%Q%$%k$5$l%$%s%9%H!<%k5l$k!# ($?$@$7!" **etags** $O Emacs Lisp 4X
$d Emacs $N0lItJ,$GOJ$$!#3l$O C $N%W%m%0%i%`$G$"$k!#)

'TAGS' %U%!%$%k$r:n@.9kKO!"$^$:3N%U%!%$%k$r:n@.7?$$%G%#%l%/%H%j$K0\F0$9$k!# Emacs $N
$H!" **M-x cd** %3%^%s%I$r;H$&$+!"$=$N%G%#%l%/%H%jK"$k%U%!%$%k$r%S%8%C%H$9k+!"0?$$$O **C-x d** (**dir
$r;H$&3H$G0\F0$9k3H,=PMh$k!#$=7F

```
M-! etags *.el
```

$H%?%$%W7Fdl$PNI$$!# **etags** %W%m%0%i%`$OIaDL$N%7%'%k$G;H$($kA4$F$N%o%$%k%I%+!<%I$rM}2r=PMh$
$($P!"b7FsDN%G%#%l%/%H%jKBP7$F0l$D$N 'TAGS' %U%!%$%k$r:n$j$?$$>l9g$O!"FsHVL\$N%G%#%l%/%
'**../elisp/**' $@$H7F!"<!Nh$&$K%?%$%W$9lP$h$$!#

```
M-! etags  *.el ../elisp/*.el
```

$^$?!" **etags** $,<u$1IU1k%*%W%7%g%s$N%j%9%H$r8+$?$$>l9gKO

```
M-! etags --help
```

$H%?%$%W9k!#

etags %W%m%0%i%`$O Emacs Lisp, Common Lisp, Scheme, C, Fortran, Pascal, LaTeX, $=$7$FBgDq$N %"%;%s%V%i$r07$&$3$H$,=PMh$k!#$3$N%W%m%0%i%`KO8@8l$rFCDj$9k?aN%9%#%C%AOJ$$!#$=$NBeoj$ %kL>$dCf?H$+i=$N%U%!%$%k$N8@8l$rG'<1$9$kNG$"$k!#

$^$? '**etags**' $O!"<+J,<+?H$G%3!<%I$r=q$$$?$j!"4{$K=q$$$?4X?t$r8e$+$i;2>H$7$?$j9kNK$bBgJQJXM $k!#?7$7$$4X?t$r=q$$$?$i!"$H$-$*$j **etags** %W%m%0%i%`$rAvi;h&!#$=$&9k3HG=1i$N4X?t$, 'T %U%!%$%k$KIU$12C$o$k!#

12.6 I|=,

$3$3GO:G6aF3F~7?4X?t$N4JC1$J$^$Har:\$;F*$/!#

while
: K\BNItJ,$N#S<0$r!"K\BN$N:G=i$NMWAG$,??$rJV$94V$@$17+$jJV$7I>2A$9$k!#:G8e$O **nil** rJV (D^$j!"$3$N<0$OI{:nMQN?a@1KI>2A5l$k!#)

Nc!K

```
(let ((foo 2))
  (while (> foo 0)
    (insert (format "foo is %d.\n" foo))
    (setq foo (1- foo))))

     ⇒      foo is 2.
            foo is 1.
            nil
```

(**insert** 4X?t$O0z?t$r%]%$%s%H$KA^F~9k!#$^$? **format** 4X?t$O0z?t$r **message** 4X?t$,@07A$9 kN$HF1MM$K@07A7F=PMh$?%9%H%j%s%0$rJV$9!# **\n** $O2~9T$G$"$k!#

re-search-forward
: %Q%?!<%s$r8!:w$7!"H/8+7?>l9gO=$ND>8e$K%]%$%s%H$r0\F0$9$k!#

search-forward $HF1MM!";M$D$N0z?t$r<h$k!#

1. 8!:w%Q%?!<%s$rI=$o$9@55,I=8=!#
2. >JN,2DG=!#8!:w$N8B3&!#
3. >JN,2DG=!#8!:w$,<:GT$7$?>l9g$KI&9k$+!# **nil** rJV9$+%(%i!<%a%C%;!<%8$r=P9+!#
4. >JN,2DG=!#8!:w$r2?2s7+$jJV9+!#Ii$N?t$NGL$O8eJ}$K8!:w9k!#

let*
: 4vD+$NJQ?t$rFCDjNCMK6I=jE*$K%P%$%s%I$7!";D$j$N0z?t$rI>2A9k!#CMH7FO:G8e$N0z? rJV9!#6I=jJQ?t$r%P%$%s%I9k:]!"hj@h$K%P%$%s%I7?JQ?t$,$"lP!"$=NCMrMxMQ=PMh$

Nc!K

```
(let* ((foo 7)
       (bar (* 3 foo)))
  (message "`bar' is %d." bar))
     ⇒ `bar' is 21.
```

match-beginning
: :G8e$N@55,I=8=$G8+D+C?%F%-%9%H$N;O$^jN0LCVrJV9!#

looking-at
: %]%$%s%H$KB3$/%F%-%9%H$,0z?t$N@55,I=8=$K%^%C%A7?>l9g$K??$H7F **t** rJV9!#

eobp %]%$%s%H$,$=$N%P%C%U%!$N%"%/%;%92DG=$J:GBg0LCVK"$k>l9g$K??H7$F t rJV9!#%"%/%;%9
$JHO0O$H$$$&NO!"b7%J%m!<%$%s%0$,$+$+CF$$$J$$>l9g$O%P%C%U%!$N:G8e$N0LCV$G$"$j!"%
%$%s%0$,$+$+CF$$$k>l9g$O!"$=$NItJ,$N:G8eG"$k!#

prog1 0z?t$r=g$KI>2A7F$$$-!":G=i$N0z?t$NCMrJV9!#

Nc!K

```
(prog1 1 2 3 4)
     ⇒ 1
```

12.7 re-search-forward KD$$$F$NN}=,LdBj

- Fs9T0J>eB3$/6u9T$K%^%C%A9k@55,I=8=$r8!:w$9$k4X?t$r=q$-$J$5$$!#
- ‘the the’ Nh$&$KFsEYB3$/C18l$r8!:w9k4X?t$r=q$-J5$$!#FsDNF1$8ItJ,$+iJ$kJ8;zNs$K%^%C%A regexp (regular expression = @55,I=8=) $N=q$-J}KD$$$F$O Section “Syntax of Regular Expression” in *The GNU Emacs Manual*, $r;29M$K7J$5$$!# regexp $N=q$-J}$O$$$/DLjb$"$k!#$=$NFb$N 4v$D$+$O;DjNbNhj$bNI$$!#;d$,MxMQ$7$F$$$k4X?t$O!"4v$D$+$N@55,I=8=$H0l=o$K<!$N=j$K5-$5 $k!# Appendix A, “4X?t **the-the**”, p. 163.

13 %+%&%s%H: 7+jJV7$H@55,I=8=

7+jJV7$H@55,I=8=$N8!:w$O!" Emacs Lisp $G%3!<%I$r=q$/:]$Kh/;Hol$kBgJQ6/NO$JF;6qG"$k!#$3
GO!"@55,I=8=$N8!:w$NMxMQ$N;EJ}$r while %k!<%W$H:F5"$r;HC?C18l$r?t$($k%3%^%s%I$N:n@.rDL7$F(
$F$$$/3HK9$k!#

I8=`E*$J Emacs $NG[I[$K$O%j!<%8%g%sFb$N9T?t$r?t$($k4X?t$,4^$^$l$F$$$k!#7+$7F1$8$3$H$rC18l$K$
9T$&4X?t$O$J$$!#

J8>O$N<oN`$KhCFOC18l$N?t$r?t$($J1lPJiJ$$$h$&$J3H$,$"$k!#%(%C%;%$$r=q$/>l9g$O 800 C
Fb$K@)8B$7$?J}$,$h$$$G$"$m$&$7!">.@b$r=q$/>l9gJI!"0lF| 1000 C18l$O=q$/$>$H7h?4$9$k3Hb"k@
8D?ME*KO Emacs $KC18l$r?t$($k%3%^%s%I$,$J$$$NOJQ@$H;W$&!#B?J, Emacs $r;H$&?M$OBgDq%3!<%I$H
%-%e%a%s%H$r=q$$$F$$$F!"C18l$N?t$r?t$($kI,MWJI$J$$$N$@$m$&!#0?$$$O Operating system ImB0$NC18l
?t$($k%3%^%s%IG"$k wc 7+;HoJ$+C?$j9kN+b7lJ$$!#O?$^$?JT=8<T$NET9g$K9go;$F!"J8
$NC18l$N?t$rJ8;z?t$r 5 $G3d$C$?$bNH7F?t$($F$$$k?M$b$$$k$+$b7l$J$$!#2?OHb"$l!"0J2<$GC18l
$($k%3%^%s%I$r>R2p$9k3HK9k!#

13.1 4X?t count-words-region

C18l?t$r?t$($k%3%^%s%I$H7F$O!"9T!"%Q%i%0%i%U!"0?$$$O%j!<%8%g%s$d%P%C%U%!$JINCf$K4^$^lkC
$r?t$(kbN,9M$($ilk!#%3%^%s%IH7FOIsJ3H^$G=PMh$lPh$$$@m&$+!#%3%^%s%I$r%P%C%U%
C18l$r?t$(kh$&$K@_7W9k3H$b=PMh$k$,!" Emacs $NEAE}$+$i$$$C$F!"$bCH=@Fp@-$r;}$?$;$?J}$,$h$
$&!#Nc$($P%P%C%U%!A4BN$GOJ$/!"$"$k%;%/%7%g%s$NCf$NC18l$N?t$r65$(kh$&$J%3%^%s%I$,M_$7$$>l9g$
k+b7lJ$$!#=>CF!"%j!<%8%g%sNCfNC18l?t$r?t$(kh$&$K@_7W7?J}$,9gM}E*$@m&!#0lEY!"3
count-words-region $H$$$&%3%^%s%I$r:n$CF7$^$($P!" C-x h (mark-whole-buffer) $r;H$C$F%P%C%U%!
A4BN$r%^!<%/$9k3HG!"%P%C%U%!A4BN$NC18l?t$r?t$($k3H$@$C$F=PMh$k!#

C18l$r?t$(k3HO!"L@i+$K7+$jJV7rH<$&F0:n$@!#%j!<%8%g%s$N;O$^j+$i%9%?!<%H$7$F:G=i$NC1
$(!"<!$KFsHVL\$K9T$-!";0HVL\$K9T$-!"$H$$$&U&K7$F%j!<%8%g%s$N:G8eKMhk$^$GB3$1$ko1G"$k!
C18l$r?t$(kH$$$&9T0Y$,!"$bHb$H:F5"$d while %k!<%W$KE,$7$F$$$k$H$$$&3H$r0UL#$9$k!#

$^$:$O!" while %k!<%W$r;HCF!"<!$K:F5"$r;HCF!"C18l$r?t$($k%3%^%s%I$r<B:]$K:n$CF_k3HK$
3liN%3%^%s%I$OL^O@$$%s%?%i%/%F%#%VG"kY$-$G$"$k!#

3l$^$GKb2?EY$b8+$?h&$K!"%$%s%?%i%/%F%#%V$J4X?t$NDj5A$N%F%s%W%l!<%H$O<!Nh$&$KJC$F$$$k

```
(defun name-of-function (argument-list)
  "documentation..."
  (interactive-expression...)
  body...)
```

3N%9%m%C%HrKdalP$h$$!#

4X?t$NL>A0$O$=$l<+BN$G0UL#$,DL$8!"$+$D4{$K$"$k4X?t count-lines-region $NL>A0$H;w$?$bNG$"$k$Y
G"$k!#$3lOL>A0$r3P$(d9$/$9k?a@!# count-words-region Js$+$,NI$$$@m&!#

3N4X?t$O%j!<%8%g%sFb$NC18l$N?t$r?t$($k!#=>CF0z?t%j%9%HKO!"%j!<%8%g%s$N;O$^jH=*oj$NFs
CV3F!9$K%P%$%s%I5l$k%7%s%\%k$,4^$^$l$F$$$J1lPJiJ$$!#3liNFsDN0LCV$O 'beginning' $H '
$H8F$Y$P$$$$$@m&!#@bL@J8;zNs$N:G=i$N9T$O0l$D$NJ8$G$"$kY-G"$k!#$H$$$&NO apropos Nh$&$J%
%I$GI=<($5lkItJ,$O0l9TL\$,A4FG$"$k$+$iG"$k!#%$%s%?%i%/%F%#%V<0$O '(interactive "r")' $H$$$
KJ$k!#$3$&$9k3HG!"%j!<%8%g%s$N;O$^jH=*oj$N0LCV$r3N4X?t$N0z?t%j%9%H$KEO$9$3H,=PMh$
$^$GOk!<%F%#!<%s%o!<%/G"$k!#

4X?t$NK\BN$O!";0DN;E;vr9kh$&$K=q$+$lJ1lPJi$J$$!#0lHVL\$O while %k!<%W$,C18l?t$($
>r7o$r@_Dj$9k3$H!"FsHVL\$O while %k!<%WrAvi$;$k3H!"$=$7$F;0HVL\$O%f!<%6$K%a%C%;!<%8$rAwk
$"$k!#

%f!<%6$, `count-words-region` $r8F$S=P7?;~E@GO!"%]%$%s%H$O%j!<%8%g%s$N;O$^$j!"$b7/$O=*$o$j $"$k!#7+$7!"%+%&%s%H$O>o$K%j!<%8%g%s$N;O$^$j$N0LCV$+$i3+;O$7J1lPJi$J$$!#=>CF!"$=$&G O^$:$=$N0LCV$^$G%]%$%s%H$r0\F0$7F*$$$FM_$7$$!# `(goto-char beginning)` $r<B9T$9k3HG!"3N H,J]>Z5l$k!#L^O@!"4X?t$,;E;v$r=*$($?$i%]%$%s%H$N0LCV$O85$N0LCVKLaC$F$$$FM_$7$$!#3N$?$a$ ItJ,$O `save-excursion` <0$G0O$`I,MW$,$"$k!#

K\BN$NCf?4ItJ,$O!"$"$k#S<0$G<!$NC18l$K0l$D$:$D%8%c%s%W$7!"$b$&0l$D$N#S<0$G%8%c%s%W$N2s?t$r `while` %k!<%W$+$iJk!# `while` %k!<%W$N??56%F%9%H$O%]%$%s%H$,b&@hXO?JaJ$/$Jk^GO??rJV7!" %8%g%s$N:G8e$^G-$?$i56rJV9h&JbNGJ1lPJi$J$$!#

%]%$%s%H$rC18l4H$K0\F0$9$k#S<0$H7F$O `(forward-word 1)` $r;H$CFb$h$$!#7+$7!"@55,I=8=$N8 $r;H$&Ji!" Emacs $,2?$rC18l$H8+Jo$9$+$r8+$kJ}$,4JC1G"$k!#

C18l$N%Q%?!<%s$r8!:w9k@55,I=8=$N8!:w$G$O!"%]%$%s%H$O%^%C%A$7$?%Q%?!<%s$N:G8e$NJ8;z$N0LCV$K $k!#=>$C$F!"B3$1$F8!:w$,@.8y7F$$$k4V$O%]%$%s%H$OC18l$r0lD:$D0\F0$7$F$$$/3HKJ$k!#

8=<BLdBjH7$F!"@55,I=8=$N8!:wGO!"C18l$@$1GOJ/C18l4V$N6uGr$d6gFIE@$r%8%c%s%W$9kh$&$K$J $FM_$7$$!#<B:]!"C18l4V$N6uGr$r1[$($F?J$^$J$$$h$&$J@55,I=8=GOFsC18l0J>e@hKO?JaJ$/$JCF7 $^$j!"@55,I=8=NCfK$OC18l$@1GJ/!"$=$N8e$KB3$/6uGr$d6gFIE@Ey$b4^$^$l$F$$$J1lPJiJ$$$ $k!# (C18l$O%P%C%U%!$N:G8e$KMhk+b7lJ$$$N$G!"8e$KI,$:$7$b6uGr$,$/$kHO8BiJ$$!#=>CF!"6 ItJ,$N@55,I=8=$O%*%W%7%g%sKJ$k!#)

$H$$$&o1$G!"2f!9$,5aaF$$$k@55,I=8=$O!"$^$:4v$D$+$NC18l9=@.J8;z$,B3$-!"%*%W%7%g%sH7$FC18l MWAG0J30$NJ8;z$,0l$D0J>e$NB3$/h&$J%Q%?!<%s$G$"$k!#3Nh&$J@55,I=8=$O<!Nh$&$K=q1k!#

```
\w+\W*
```

INJ8;z$,C18l9=@.J8;z$G$"$j!"INJ8;z$,$=$&$G$J$$$+$O!"$=$N%P%C%U%!$N%7%s%?%C%/%9%F!<%V%kKh$ 7/$O Section 14.2, “C18l$d%7%s%\%k$O2?$+$i9=@.$5lF$$$k$+”, p. 120, 0?$$$O Section “The Syntax Table” in *The GNU Emacs Manual*, $d Section “Syntax Tables” in *The GNU Emacs Lisp Reference Manual*, $r;2>H!#)

8!:wN?aN#S<0$O<!$NDLjG$"$k!#

```
(re-search-forward "\\w+\\W*")
```

(‘w’ $d ‘W’ $NA0$K$O%P%C%/%9%i%C%7%e$,FsD:DAHKJC$F$$$k3H$KCm0U$7h&!#C1FH$N%P%C%/%9%i%C% Emacs %$%s%?%W%j%?KHCFFC<l$J0UL#$r;}CF$$$k!#D^$j!"8e$KB3$/J8;z$,IaDLHO0[Jk0UL#$K2r <$kNG$"$k!#Nc$($P!" ‘\n’ $H$$$&FsDNJ8;z$O!"%P%C%/%9%i%C%7%e$KB3$/ ‘n’ GOJ/!"2~9T%3!<%I$rI=$ %P%C%/%9%i%C%7%e$,Fs$DB3$$$F=iaFDL>o$N!VFC<l$G$J$$!W%P%C%/%9%i%C%7%e$rI=$o9NG"$k!#)

(LuCp!’D^$j!"%P%C%/%9%i%C%7%e$,FsDMWkNO!"$=$l$,0lEY Emacs %$%s%?%W%j%?KhCF0lDN%P% %i%C%7%e$K2r<a$5l?8e$N7k2L$,@55,I=8=H7$F2r<a$5lk$?$aG"$k!#$3$3$O:.Mp7d$9$$$N$GCm0U$7$h

$$$/$DC18l$,$"$C$?$+$r?t$(k?aN%+%&%s%?bI,MWG$"$k!#3NJQ?t$O:G=i$O 0 $K%;%C%H$5$l!" while %W$r0l$D7+$jJV$9EY$K0lD:$DA}$($F$$$/!#3N0l$DA}$d9?aN#S<0$OC1$K

```
(setq count (1+ count))
```

$@$1Gh$$!#5F!":G8e$K%f!<%6$KBP7F%j!<%8%g%s$K$$$/$DC18l$,$"$C$?$+rCNi$;$?$$!#3Nh&$K% >pJs$rI=<(9kL\E*KO!" `message` 4X?t$,MQ0U$5lF$$$k!#:#$N>l9g!"%a%C%;!<%8$OC18l$N?t$,$$$/D"$ 9gGb$-$AsH7?J8>OKJCF$$$J1lPJiJ$$!#Nc$($P!" “there are 1 words in the region” $H$$$&$ $&$KJCFO:$$k!#C18l$,0l$DJN$KJ#?t7A$,;HolkN$OJ8K!E*$K@5$7$/$J$$$+iG$"$k!#3NLdBj$O! 4t<0$rMQ$$$FC18l?tKhCF%a%C%;!<%8rJQ(kh$&$K9l$P2sHr=PMh$k!#2DG=@-$O;0$D$"$k!#0lDO%j! FbKOA4$/C18l$,L5$$>l9g!"b&0lDO0l8D$@$1$"$k>l9g!"$=$7$F!"J#?t$NC18l$,$"$k>l9g$G$"$k!#3N$ 9gKO `cond` $r;H$&Hh$$$NG"C?!#

0J>e$rAm9g$9kH!"<!Nh$&$J4X?tDj5AKJ$k!#

```
;;; :G=i$N%P!<%8%g%s: %P%0$"$j!*
(defun count-words-region (beginning end)
  "Print number of words in the region.
Words are defined as at least one word-constituent
character followed by at least one character that
is not a word-constituent.  The buffer's syntax
table determines which characters these are."
  (interactive "r")
  (message "Counting words in region ... ")

;;; 1. E,@Z$J>u67$N@_Dj!#
  (save-excursion
    (goto-char beginning)
    (let ((count 0))

;;; 2.  while loop $rAv$i$;$k!#
      (while (< (point) end)
        (re-search-forward "\\w+\\W*")
        (setq count (1+ count)))

;;; 3. %f!<%6$K%a%C%;!<%8$rAw$k!#
      (cond ((zerop count)
             (message
              "The region does NOT have any words."))
            ((= 1 count)
             (message
              "The region has 1 word."))
            (t
             (message
              "The region has %d words." count))))))
```

$,!"0J2<$K=q$+$l$F$$$kDL$j!"$3$N4X?t$OA4FN>u67G-As$HF0:n$9ko1GOJ$$!#

13.1.1 count-words-region $N6uGrJ8;z$K4X9k%P%0

A0@a$G@bL@$7$? **count-words-region** %3%^%s%IKO!"FsDN%P%0!"$H$$$&$+Fs$D$N8=$lJ}r9$k0l$D
%P%0$,$"$k!#$^$:!"Nc$(%j!<%8%g%s$,$"$kJ8>O$NESCfK"$k6uGrJ8;z$7$+4^$^$J$$>l9gGb!" **count-wo
region** $OC18l$,0lD"kH8@CF$/$k!#$^$?!"%P%C%U%!$J$$$7$O%"%/%;%92DG=$JItJ,$N:G8e$K$"$k6uGrJ
$+4^$^$J$$>l9g$O!"

```
Search failed: "\\w+\\W*"
```

$H$$$&%(%i!<%a%C%;!<%8$,JV$CF7$^$&!#3NJ8$r GNU Emacs $N Info GFIs$G$$$kJi!"3N%P%0$r<B
<+J,$G3N$+ak3H$,=PMh$k!#

$^$:O3$N4X?t$r$$$DbDLjI>2A7F%$%s%9%H!<%k$7h&!#

$*K>$_Ji!"<!$N<0$rI>2A9k3HG3$N%3%^%s%I$N$?$a$N%-!<%P%$%s%G%#%s%0$b%$%s%9%H!<%k=PMh$k!#

```
(global-set-key "\C-c=" 'count-words-region)
```

:G=i$N%F%9%H$r9k$?$a$K!"<!$N9T$N:G=i$H:G8e$K%^!<%/$H%]%$%s%H$r@_Dj7F C-c = (0?$$$O C-c = $H
%-!<%P%$%s%G%#%s%0$r%$%s%9%H!<%k$7$F$$$J1l$P M-x counts-words-region) $H%?%$%W7h$&!#

```
one   two  three
```

Emacs $O%j!<%8%g%s$K$O;0$D$NC18l$,$"$k$H@5$7$/Ez$(kO$:$@!#

<!$K!"%^!<%/$r9TF,$K%;%C%H$7$F!"%]%$%s%HrAg&$I ‘one’$H$$$&C18l$NA0$KCV$$$FF1$8%F%9%H$r7 $&!# C-c = (0?$$$O M-x count-words-region) $H%?%$%W7?>l9g!" Emacs $O%j!<%8%g%s$K$O0l$D$bC18l$, $J$$$HEz$($kY-G"$k!#%j!<%8%g%s$K$O9TF,$N6uGrJ8;z$@$1$7$+4^$^$l$J$$$+i@!#7+$7<B:]$O Ema %j!<%8%g%sKO0lDNC18l$,$"kHEz$($F$/$k!*

;0HVL\$K!"%5%s%W%k$N9T$r ‘*scratch*’ %P%C%U%!$N:G8e$K%3%T!<7F9T$N=*$ojK4vD+6uGrJ8;z$r%?%$ F+$i!"%^!<%/$r ‘three’ $ND>8e$K!"%]%$%s%H$r9TKv$K@_Dj$9$k!# (B($A!"9TKv$r%P%C%U%!$N:G8eK9$k!#) G5C-$HF1$8$/ C-c = (0?$$$O M-x count-words-region) $H%?%$%W7h$&!#6uGrJ8;z$7$+$J$$$N$@$+$i! :#2s$b Emacs $OC18l$O0lDb$J$$$HEz$($kY-G"$k!#$7$+$7!" Emacs $O ‘Search failed’ $H$$$&%($i! %a%C%;!<%8$rI=<(9k!#

3NFsDN%P%0$O6&DL$9$kLdBj$+$i@8$8$?$bN@!#

:G=i$N%P%0$r9M$($F$_$h$&!#%3%^%s%I$r<B9T9k$H!"6uGr$@$1$7$+$J$$$O$:$N9TF,ItJ,$K0l$D$NC18l$,4 $$$k$H8@$CF-$?$NG"C?!#3l$O2?8N$@m&$+!) M-x count-words-region %3%^%s%I$O!"$^$:%]%$%s%H %j!<%8%g%s$N:G=i$K0\F0$5$;$k!# while %F%9%H$O point NCM, endNCMhjb>.$5$$$+I&$+%F%9%H$9$k 1O@5$7$$$N$G!"7k2L$H7F:G=i$NC18l$r8+D1$k@55,I=8=$N8!:w$,<B9T$5$l!":G=i$NC18l$,8+$D$+$k!#% $OC18l$N8emK0\$5$l!" count $O 1 $K%;%C%H$5lk!# while %k!<%WOb$&0lEY<B9T$5lk$,!":#EY$O%]%$ NCM, end NCMhjbBg$-$/JkNG!"%k!<%WO=3G=*N;9k!#$=$7F3$N4X?t$O!"%j!<%8%g%sFb$NC1 D@$H8@$$&%a%C%;!<%8$rI=<($9kH$$$&o1G"$k!#<jC;$K$$$&$H!"@55,I=8=$N8!:wGO!"C18l$,%j!<%8% K"kK$b4X$oi:!"C18l$rH/8+$7F7$^$&NG$"$k!#

FsHVL\$N%P%0$N>l9g!"%j!<%8%g%sFb$K$O%P%C%U%!$N:G8e$N6uGrJ8;z$@$1$7$+$J$+$C$?!# Emacs $O ‘Sea failed’ $H8@$&!#3l$O2?8N$+!) $^$::G=i$N while %k!<%W$G$O??56%F%9%H$O??KJkN$G!"8!:w$,<B9T5l 7+$7!"%P%C%U%!$N:G8eKOC18l$O0l$DbJ$$$N$G!"8!:w$O<:GT9k$H$$$&o1G"$k!#

IAiN8=>]$b!"8!:w$,%j!<%8%g%s$r1[$($F<B9T$5lk=j$KLdBj$,$"$C$?!#

2r7hK!$O!"8!:w$r%j!<%8%g%s$K@)8B$9k3HG$"$k — 3lO+JjC1=c$JF0:n$K;W$($k$,!"<B:]$K9M$($H!";WC?Dx4JC1KO$$$+$J$$$3H,J,$k!#

:#$^$G8+F-$?$h$&$K!" re-search-forward 4X?t$O:G=i$N0z?t$r8!:w%Q%?!<%s$H9k!#7+$7!"$3$N: $NI,?\$N0z?t$NB>$K!";0DN>JN,2DG=$J0z$-?t$r<h$k3H$,=PMh$k!#>JN,2DG=G"$kFsHVL\$N0z?t$O8!:w$ $"$k!#%*%W%7%g%sG"$k;0HVL\$N0z?t$O!"$b$7 t Ji8!:w$K<:GT7?>l9g$K%(%i!<$r=P5:$K nil rJV %W%7%g%sG"$k;MHVL\$N0z?tKO7+jJV7$N2s?t$r;XDj9k!# (Emacs GO!"4X?t$Dj5A$N@bL@J8;zNs$r8+$ C-h f $KB3$1$F4X?t$L>$r%?%$%W7F RET %-!<$r2!$;Ph$$!#)

count-words-region $NDj5AFb$G$O!"JQ?t end $K%j!<%8%g%s$N:G8eNCM,3N4X?t$N0z?t$H7FEO5lJ] 5l$k!#$=3G!"@55,I=8=$N8!:w$N0z?tH7$F!"$3$N end NCMrM?$(F_h&!#

```
(re-search-forward "\\w+\\W*" end)
```

7+$7!"$b$7 count-words-region NCMK3NJQ99$@$1$7$+2C$($:$K!"?7$7$$%P!<%8%g%s$N4X?t$r!"6uG 1N>l=j$G%F%9%H$9kH!" ‘Search failed’ $H$$$&%a%C%;!<%8$,JV$5lk!#

3lOI$&$7F+$H$$$&$H!"%j!<%8%g%sFb$K$OC18l$r9=@.9kJ8;z$,L5$$$?aK!"8!:wr=3K@)8B9 :w$,<:GT$7F7$^$&NG$"$k!#$=$N$?$a$K%(%i!<%a%C%;!<%8$,JV5l$k!#$7$+$7!"3N>l9g$K%(%i!<%a%C% <u$1<hj?$/$J$$!#4|BT5lkN$O "The region does NOT have any words." $H$$$&%a%C%;!<%8G"$k!#

3NLdBj$r2sHr$9kK$O re-search-forward $K;0HVL\$N0z?tH7$F t $rM?$(lPNI$$!#9k$H4X?t$O %i!<%a%C%;!<%8NBeojK nil rJV9!#

7+$7!"$3$NJQ99$r2C$($F$+$ib&0lEY%F%9%H7F$_$k$H!" “Counting words in region ... ” $H$$$&%a%C %;!<%8$,I=<($5l?8e$$$/iBTCFb2?$bI=<($5lJ$$!#7k6I C-g (keyboard-quit) $H%?%$%W9k$^$G$: 3N%a%C%;!<%8$r8+B3$1k3HKJk!#

I&7F3&Jk$+$@$,!"8!:w$O%j!<%8%g%s$K@)8B$5lF$$$kNG5C$-$HF1$8$h$&$K<:GT9k!#3l %8%g%sKOC18l$r9=@.$9$kJ8;z$,4^$^$l$J$$$N$@$+$i4|BTDL$jG"$k!#7k2L$H7F re-search-forward < nil rJV9!#$=$7$FB>$N3H$O2?$b7J$$!#FC$K!"%]%$%s%H$rF0$+7?jb7J$$!#3l$O8!:w$K@.8y7?>l

:nMQ$@$+i@!# **re-search-forward** $, **nil** rJV7$?8e!" **while** %k!<%W$N<!$N#S<0$,I>2A5l$k!#$3lO%
%&%s%?$r0l$DA}d9!#$=$7$F!"<!$N%k!<%W$K0\$k!# **re-search-forward**<0$G%]%$%s%H$,0\F0$7$J$$$?aK!
%$%s%H$NCM$O **end** NCMhjb>.$5$$$^$^$G$"$j!"??56%F%9%H$O??$KJk!#$=$7$F%k!<%W$,7+jJV5lk!#
$:$C$HB3$/ ...

8!:w$,<:GT$7$?>l9g$O **while** %k!<%W$N??56%F%9%H$,56rJV9h&K9k?aK!"$^$?bd **count-word**
region $NDj5A$KJQ99$r2C$(kI,MW,$"$k!#B($A!"%+%&%s%?$r0l$DA}$d$9A0$K9T$&??56%F%9%H$GOFsD$N>r
$?$5lJ1lPJiJ$$$N$@!#0l$D$O%]%$%s%H$,%j!<%8%g%sFb$K$"$k3H!"b&0lDO8!:wKhCFC18l$
k3HG$"$k!#

:G=i$N>r7o$bFsHVL\$N>r7o$bF1;~$K??KJiJ1l$P$$$1$J$$$N$G!"<!$Nh&$K%j!<%8%g%s%F%9%H$r9T$&
8!:w$r9T$&#S<0NFsD$N#S<0$r **and** 4X?t$GO"7k$7$F **while** %k!<%W$N??56%F%9%HKKda9~$`$3HK7h$&!#

```
(and (< (point) end) (re-search-forward "\\w+\\W*" end t))
```

(**and** 4X?tKD$$$F$N>\:Y$O!" Section 12.4, “**forward-paragraph**: 4X?t$N6bL.”, p. 99, $r;2>H!#)

re-search-forward <0$O!"$b$78!:w$,@.8y7?>l9g$O??$rJV$7!"I{:nMQ$H7F%]%$%s%H$r0\F0$9$k!#7k2
7F!"C18l$,8+$D$+$C$?>l9g$K$O%]%$%s%H$O%j!<%8%g%s$r1[$($F7^$&$3H,$"$k!#8!:w$,<:GT$7$?>l9g$
%H$,%j!<%8%g%s$N=*ojKMhF7^C?>l9g$O!"??56%F%9%H$O56rJV7!" **while** %k!<%W$,=*N;$7$F!"%a%C%
$,I=<($5lk!#

3liN:G=*E*$JJQ99$r2C$($k$H!" **count-words-region** $O (>/$J$/$H$b;d$,8+$?HO0O$G$O!*) %P%0L5$7
F0:n9kh&KJ$k!#%3!<%I$O<!NDLjG"$k!#

```
;;; :G=*%P!<%8%g%s: while
(defun count-words-region (beginning end)
  "Print number of words in the region."
  (interactive "r")
  (message "Counting words in region ... ")

;;; 1. E,@Z$J>u67$N@_Dj
  (save-excursion
    (let ((count 0))
      (goto-char beginning)

;;; 2.  while loop $rAv$i$;$k!#
      (while (and (< (point) end)
                  (re-search-forward "\\w+\\W*" end t))
        (setq count (1+ count)))

;;; 3. %f!<%6$K%a%C%;!<%8$rAw$k
      (cond ((zerop count)
             (message
              "The region does NOT have any words."))
            ((= 1 count)
             (message
              "The region has 1 word."))
            (t
             (message
              "The region has %d words." count))))))
```

13.2 :F5"$r;H$C$?C18l?t$N%+%&%s%H

C18l$r?t$($k4X?t$O **while** %k!<%WGOJ/:F5"$r;H$CFb=q$/$3H,=PMh$k!#<B:]$KINh&KJk+$
$_$h$&!#

$^$:!" count-words-region 4X?t$O;0$D$N;E;v$r9k$H$$$&3HrOC-$jG'<1$7F*3&!#=iaK!"%-
%s%H$r9T$&:]NE,EvJ>r7o$r@0$(!"<!$K%j!<%8%g%sFb$NC18l$r?t$(!":G8e$KC18l$N?trCNi$;$k%a%C%;!<%
%6KBP7I=<(9k$H$$$&o1G"$k!#

3liN;E;v$rA4$F0lDN:F5"4X?tGdi;h&H9kH!"A4FN:F5"8F$S=P$7$G%a%C%;!<%8$r<u$1<h$(
$&$3HKJk!#Nc$($P%j!<%8%g%s$K 13 $NC18l$,$"$C$?>l9g!" 13 8D$N%a%C%;!<%8$,JB$sG7$^$&N@!#3
:$$k!#$=$3$G!"$3li$N;E;v$rFsDN4X?t$KJ,$1Fdi;k3HK9k!#0lDr:F5"4X?tK7$F!"$=lr$
$G8F$S=P9NG"$k!#JRJ}$O>r7o$r@0$(!"%a%C%;!<%8$rI=<($9kbNG$"$j!"b&JRJ}$O!"C18l$r?t$($k$
$k!#

$^$:$O%a%C%;!<%8$rI=<(9kJ}$N4X?t$+$i;O$ah&!#:#2s$b4X?t$NL>A0$O count-words-region $r;H$&$
K9$k!#

3AiO%f!<%6$,8F$S=P$9J}$N4X?tG"$j!"%$%s%?%i%/%F%#%VJbNKJk!#<B$N=j!"$3lO3N4X?t
$N%P!<%8%g%s$K$=$C$/$jG"$k!#$?$@$7!"%j!<%8%g%sFb$NC18l$r?t$($k$?$a$K!"ESCf$G recursive-cou
words $r8F$S=P7F$$$k=j$@$1$,0c$&!#

A02s$N4X?t$r;29MK9lP!"4JC1K3$N4X?t$N%F%s%W%l!<%H$r:n$k3H$,=PMh$k!#

```
;; :F5"%P!<%8%g%s; @55,I=8=8!:w$rMxMQ
(defun count-words-region (beginning end)
  "documentation..."
  (interactive-expression...)

;;; 1. E,@Z$J>u67$N@_Dj
  (explanatory message)
  (set-up functions...

;;; 2. C18l?t$N%+%&%s%H
    recursive call

;;; 3. %f!<%6$K%a%C%;!<%8$rAw$k!#
    message providing word count))
```

3NDj5A$OHs>o$KAGD>$K=q$+lF$$$k$,!":F5"8F$S=P7GJV5l$?%+%&%s%H$rC18l$N?t$rI=<(9k%a%C
$KEO$9=j$,!"4vJ,$dd3$7$$$+b7lJ$$!#3l$O!"$AgC$H9M$(lP!" let 4X?t$r;H$(Ph$$$H5IU/
$j!" let <0$NJQ?t%j%9%H$NJQ?t$K!":F5"4X?t$+$iJV5l$?%j!<%8%g%sFb$NC18l?t$r%P%$%s%I9lPh$$
$k!#$=$N8e!" cond <0$rMxMQ7F$=$NCM$r%f!<%6$KI=<(9k!#

let <0NCfG$NJQ?t$N%P%$%s%I$H$$$&$H!"2?$+4X?t$NFs5AE*$J;E;v$K;W$olk3H$bB?$$!#7+$7!":#$N
$O!"4X?t$N<g$J;E;v$@$H;W$olkC18l$r?t$(kH$$$&3H$,!" let <0$NCf$G9T$olk3HKJ$k!#

let $r;H$&$H!"4X?tDj5A$O<!Nh$&$KJk!#

```
(defun count-words-region (beginning end)
  "Print number of words in the region."
  (interactive "r")

;;; 1. E,@Z$J>u67$N@_Dj
  (message "Counting words in region ... ")
  (save-excursion
    (goto-char beginning)

;;; 2. C18l?t$N%+%&%s%H
    (let ((count (recursive-count-words end)))
```

```
;;; 3. %f!<%6$KBP$7%a%C%;!<%8$rAw$k
      (cond ((zerop count)
             (message
              "The region does NOT have any words."))
            ((= 1 count)
             (message
              "The region has 1 word."))
            (t
             (message
              "The region has %d words." count))))))
```

<!$K!":F5"4X?t$NJ}$K0\$m$&!#

:F5"4X?t$O>/$J$/$H$b;0$D$NItJ,$r;}$?$MPJiJ$$!# 'do-again-test'!" 'next-step-expression'!"$=$7$F!"
:F5"8F$S=P$7G"$k!#

do-again-test $O4X?t$,<+J,<+?Hrb$&0lEY8F$V$+$I$&$+$r7hDj$9kbNG$"$k!#$3$3GO%j!<%8%g%sFb$N
$r?t$(!"$=$NCf$NC18l$NJ,$@$1A0$K0\F0$9kNG"k+$i!" do-again-test GO%]%$%s%H$,$^$@%j!<%8%g%s
ItK"k+I&$+$r%A%'%C%/9l$PNI$$!#D^$j!"%]%$%s%HNCMrD4YF!"$=$l$,%j!<%8%g%s$N=*oj$NC
>.$5$$$+Bg$-$$$+rHfYko1G$"$k!#%]%$%s%H$NCM$rD4$YkK$O point 4X?t$r;H$($P$h$$!#%j!<%8%g%s
jNCM$O!"L^O@!"$3$N:F5"4X?t$N0z?tH7FEO9I,MW$,$"$k!#

99$K do-again-test GO8!:w$GC18l$,8+D+C?$+I&$+$b%F%9%H$7J1lPJi$J$$!#L5$+$C$?>l9g$O
8F$S=P$7r9Y-GO$J$$!#

next-step-expression $O:F5"4X?t$,<+J,<+?H$N8F$S=P7r;_akY-;~$K;_$akh$&$KCM$rJQ2=$5$;$kb
$"$k!#hj@53N$K8@$&$H!" next-step-expression $OE,@Z$J;~$K do-again-test $,:F5"8F$S=P7r7+jJV9Nr
;_akh&$K!"CM$rJQ2=5;$F$$$/!#:#$N>l9g$J$i!" next-step-expression $O%]%$%s%H$rC18l$4HK0\F0$5$
$$$/#S<0KJ$k!#

:F5"4X?t$N;0$DL\$NItJ,$O!":F5"8F$S=P7G$"$k!#

$^$?!"I3$+$K3N4X?t$N<B:]$N!V;E;v!Wr9$kItJ,!"$D$^$jC18l?t$r?t$($kItJ,$r=q$/I,MW$,$"$k!#$3
HV=EMW$JItJ,$@!*

$,!"$Hb+$/!":F5"4X?t$N%"%&%H%i%$%s$O=PMh$?!#

(defun recursive-count-words (region-end)
  "*documentation...*"
   do-again-test
   next-step-expression
   recursive call)

3N%9%m%C%HrKda$F$$$1Ph$$!#$^$:$O!"0lHVC1=c$J>l9g$+$i;Oah$&!#$b$7%]%$%s%H$,%j!<%8%g%s$N
b7$/$O$=$l0J9_$N0LCV$K$"$C$?>l9g$O!"%j!<%8%g%sFbKOC18lOJ$$!#=>CF!"4X?t$O 0 rJV9Y-G
MM$K8!:w$,<:GT7?>l9g$bC18l$O$J$$$N$G!" 0 rJV9Y-G"$k!#

0lJ}!"b7%]%$%s%H$,%j!<%8%g%sNCfK$"$C$F8!:w$,@.8y7?>l9gKO!"4X?t$O<+J,<+?H$r:FEY8F$S=P$
$"$k!#

$H$$$&o1$G!" do-again-test $O<!$Nh&KJ$k!#

```
(and (< (point) region-end)
     (re-search-forward "\\w+\\W*" region-end t))
```

8!:wr9$k#S<0$b do-again-test $N0lIt$G$"$k3H$KCm0U$7h&!#3N4X?t$O8!:w$,@.8y9l$P t rJV7
GT9l$P nil rJV9!# (Section 13.1.1, "`count-words-region` $N6uGrJ8;z$K4X9k%P%0", p. 111, $r8+$l
$P!" `re-search-forward` $,$INh$&$KF0:n9k$+$,J,$k!#)

do-again-test $O **if** <0$N??56%F%9%HG"$k!#L@$i$+$K!"b7??56%F%9%H$,??$@C?>l9gKO!" **if** <0O3$
?t$r:FEY8F$S=P5J1lPJiJ$$!#$,!"$b756@C?>l9gKO!" else-part KhCFNm$,JV$5lkY-G
2?8NJi!"C18l$,8+$D$+$iJ+C?$H$$$&3H$O!"%]%$%s%H$,%j!<%8%g%s$N30$@$C$?$j8!:w$K<:GT$7$?$H$
$@$+i@!#

7+$7!":F5"8F$S=P7K$D$$$F9M$($kA0$K!" next-step-expression KD$$$F9M$($kI,MW$,$"kN$@$C$?!#$
$O:#$N>l9g2?$+!) 6=L#?<$$$3HK!"3l$O do-again-test $N8!:wItJ,$JNG$"$k!#

do-again-test $G **t** $d **nil** rJV9$3HK2C$($F!" **re-search-forward** $O8!:w@.8y;~$K$OI{:nMQ$H7F%]
%$%s%H$rA0J}$K0\F0$9$k!#$3l3$=$,!"%]%$%s%H$,%j!<%8%g%sFb$r0\F0$7$-$C$?>l9g$K!":F5"4X?t$,<+J,<
$S=P$9Nr;_akh&$K%]%$%s%HNCMrJQ2=5;$F$$$/F0:nJNG"$k!#$H$$$&o1$G!" **re-search-forw**
<0$, next-step-expression KJCF$$$kNG$"$k!#

=>CF **recursive-count-words** $N%"%&%H%i%$%s$O<!$Nh&KJ$k!#

```
(if do-again-test-and-next-step-combined
    ;; then
    recursive-call-returning-count
  ;; else
  return-zero)
```

3l$K%+%&%s%H$r?t$($5$;$kh&$J5!9=$rAH9~$`$K$O!"$I$&$7$?$i$h$$$@m&$+!# next-step-expression
$O0lC18l$4HKA0J}$K?J$_!"=>CF:F5"8F$S=P$7$O0l$DC18l$r?J$`4H$K9T$olko1$@$+$i!"%+%&%s%H$
recursive-count-words $,8F$Plk4H$K?t$r0l$DA}$d9h$&$JbNGJ1lPJiJ$$!#

4vD+$N>l9g$r9M$($F$_$h$&!#

- %j!<%8%g%sFbKFsD$NC18l$,$"$C$?>l9g!"$3$N4X?t$O!":G=i$NC18l$r?t$($k;~KJV7$?CM$K%j!<%8%g
  jNC18l?t!":#$N>l9g$J$i 1!"$rB-7??t$K 1 $r2C$($?CM$rJV5J1lPJiJ$$!#
- %j!<%8%g%sFb$K0l$D$@$1C18l$,$"C?>l9g!"3N4X?t$O!":G=i$NC18l$r?t$($k;~$KJV7?CM$K%j!<%8
  ;DjNC18l?t!":#$N>l9g$J$i 0!"$rB-7??t$K 1 $r2C$($?CM$rJV5J1lPJiJ$$!#
- %j!<%8%g%sFb$K0l$D$bC18l$,J1lP!"3N4X?t$O 0 rJV9Y-G"$k!#

0J>eN3H+$i!" **if** <0$N else-part GO!"C18l$,0l$DbJ$+$C$?>l9g$N$?$a$K 0 rJV;Ph$$$3H,J,$k
lO!" **if** <0$N then-part GO;DjNC18l$N9g7WNCMK 1 2C$($?CM$rJV9Y$-$@$H$$$&3H$r0UL#$9$k!#

<B:]$N#S<0$O<!Nh$&$KJk!#$3$3$G!" **1+** $O0z?t$K 1 2C$($k4X?tG"$k!#

```
(1+ (recursive-count-words region-end))
```

0J>e$+$i **recursive-count-words** 4X?tA4BN$O<!$Nh&KJ$k!#

```
(defun recursive-count-words (region-end)
  "documentation..."

;;; 1. do-again-test
  (if (and (< (point) region-end)
           (re-search-forward "\\w+\\W*" region-end t))

;;; 2. then-part: :F5"8F$S=P$7
      (1+ (recursive-count-words region-end))

;;; 3. else-part
    0))
```

<B:]KINh$&$JF0:nr9k+$r8+$F$_$h$&!#

b7!"%j!<%8%g%s$KC18l$,0lDbJ1lP!" if <0$N else-part $,I>2A$5$l!"7k2L$H7F3N4X?t$O 0 $rJV

b7!"%j!<%8%g%s$KC18l$,0lD"lP!"%]%$%s%H$NCM$O region-end NCMhjb>.5/!"8!:w$O@.8y$9$k
$N>l9g!" if <0$N??56%F%9%H$O??$rJV$7!" then-part $,I>2A$5$l!"%+%&%s%H<0$,I>2A5l$k!#$3$N<0$,JV$9CM
?tA4BNNJV9CMKJkN$@$,!"3l$O!":F5"8F$S=P7GJV5l$?CM$K 1 2C$($?CMG"$k!#

H3mG!"3N;~F1;~$K next-step-expression KhCF%]%$%s%H$,%j!<%8%g%sFb$N:G=i$NC18l ($H$$$C
$b:#$O3N018D$@$1$@$,) $r1[$($F0\F0$9$k!#$D$^$j!" (recursive-count-words region-end) $,Fs2s
L\$KI>2A5l$?;~$K$O!"%]%$%s%H$N0LCV$O%j!<%8%g%s$N=*$o$j0J9_$N0LCVK"k3HKJk!#=>CF!"
recursive-count-words $O 0 rJV9!#3lK5C-$N 1 $,2C$(il!"7k2LH7$F85$N recursive-count-
words $O 0 B-$9 1!"D^$j!" 1 rJV9$3HKJk!#$3lO@5$7$$?tG"$k!#

$3$3$^$G$/$l$P8e$Ob&$*J,$j$@$H;W$&$,!"%j!<%8%g%sNCfKC18l$,Fs$D$"$k>l9gKO!":G=i$K8F$S=P
recursive-count-words $O<!$K;DjNC18l$r4^$`%j!<%8%g%s$G8F$S=P5l$? recursive-count-words $N
CM$K 1 2C$($?CM!"$D$^$j!" 1 + 1 = 2 $H$$$&CMrJV9!#3l$b@5$7$$?tG"$k!#

F1MMK7$F!"$b$7%j!<%8%g%s$NCf$KC18l$,;0D"$k>l9g$b!":G=i$K8F$S=P5l$? recursive-count-wor
$O;D$j$N%j!<%8%g%s$G8F$S=P$5l? recursive-count-words NCMK 1 2C$($?CMrJV9!#3Nh&$J46$8$G
C18l$,Bt;3$"$k>l9g$b@5$7$$?trJV7F/lk!#

@bL@J8;zNs$b40A4$KD1kH!"FsDN4X?t$O<!$Nh&KJ$k!#

:F5"4X?t:

```
(defun recursive-count-words (region-end)
  "Number of words between point and REGION-END."

;;; 1. do-again-test
  (if (and (< (point) region-end)
           (re-search-forward "\\w+\\W*" region-end t))

;;; 2. then-part: :F5"8F$S=P$7
      (1+ (recursive-count-words region-end))

;;; 3. else-part
    0))
```

30B&$N4X?t (wrapper):

```
;;; :F5"%P!<%8%g%s
(defun count-words-region (beginning end)
  "Print number of words in the region.

Words are defined as at least one word-constituent
character followed by at least one character that is
not a word-constituent.  The buffer's syntax table
determines which characters these are."
  (interactive "r")
  (message "Counting words in region ... ")
  (save-excursion
    (goto-char beginning)
    (let ((count (recursive-count-words end)))
      (cond ((zerop count)
             (message
              "The region does NOT have any words."))
```

```
((= 1 count)
 (message "The region has 1 word."))
(t
 (message
  "The region has %d words." count))))))
```

13.3 N}=,LdBj: 6gFIE@$N%+%&%s%H

while %k!<%W$r;H$C$F!"%j!<%8%g%sFb$N6gFIE@ — =*;_Id!"%+%s%^!"%;%_%3%m%s!"%3%m%s!"46C2Id!"5?Ld $N?t$r?t$($k4X?t$r=q$-J5$$!#F1$84X?t$r:F5"4X?t$r;H$C$F=q$-J5$$!#

14 defun Fb$NC18l$N%+%&%s%H

<!$N7W2h$NL\I8$O!"4X?tDj5A$NCf$NC18l$N?t$r?t$(k3HG$"$k!#Ev$?$jA0N3H@$,!"$3lO count-w region $N;H$$J}rAgC$H9)IW$9lP=PMhF7$^$&!# Chapter 13, "%+%&%s%H: 7+jJV7$H@55,I=8=", p. 10 $r;2>H$N3H!#Nc$($P!"$"$k0lDNDj5ANCfNC18l?t$r?t$($?$1lP!" C-M-h (mark-defun) %3%^%s%I$r;H$ Dj5AItJ,$r%^!<%/$7F+$i count-word-region $r8F$S=P$;$P$h$$!#

7+7J$,$i!"$3$3GObCHBg-J3HrdCF_$?$$$H;W$&!# Emacs $N%=!<%9$NCf$NA4$F$NDj5A$NC 8l$H%7%s%\%k$N?t$r?t$($F!"$=3KIl$@$1$N4X?t$,$"$j!"3F!9$,I$N$/$i$$$ND9$5$+$r%0%i%U$K7F=PN $+!"$Il@1N4X?t$, 40 $+$i 49 $NC18l$H%7%s%\%k$r;}$D$+!" 50 $+$i 59 GOI&$+!"$H$$$C$?$3HrD4$ G"$k!#;d$O7P7PE57?E*$J4X?t$H$$$&N,IN$/$i$$$ND9$5$+rCNj$?$/Jk!#3l$O!"$=$&$$$C$?$ $($F$/$lkNG"$k!#

OC$-$j8@CF!"3N%R%9%H%0%i%`$r=q$/7W2h$O?M$r$R$k$^$;$kN`NbNG$"$k!#7+$7!"$3lr$$$/$ $+$$%9%F%C%W$KJ,$1$F!"3F!9$r0lD:$D8+$F$$$/3HK9lP!"$=$l$[$I62lk$[$INbNGOJ$$!#$=$ sJ%9%F%C%W$KJ,$1kY$-$+$r=q$$$F$_$k3HK9$k!#

- $^$::G=i$K!"0l$D$NDj5A$NCf$KC18l$,Il$@$1$"$k$+$r?t$($k4X?t$r=q$/!#$3$3GO!"C18l$HF1$8$/ %k$rI&07$&$+$,LdBj$KJk!#
- FsHVL\$K3F!9$N4X?t$NCf$NC18l?t$r%j%9%HK9$k4X?t$r=q$/!#$3$N4X?t$G$O count-words-in-defun ;H$&$3H,=PMh$k!#
- ;0HVL\$K!"3F%U%!%$%k$NCf$N3F4X?t$NCf$NC18l?t$r%j%9%HK9$k4X?t$r=q$/!#$3lrdm$&$H9k$H E*$K!"<+F0E*$KMM!9$J%U%!%$%k$r8+D1F=li$K0\$j!"$=$l$K4^$^lk4X?tDj5ANCfNC18l?t$r?t $$$&3Hr7J1lPJiJ/Jk!#
- ;MHVL\$K!";0HVL\$N%9%F%C%W$G:n@.$7$??t$N%j%9%H$r%0%i%U$H7F=PNO9kNKE,7?7A$KJQ49$9$k =q$/!#
- 8^HVL\$K7k2L$r%0%i%U$H7FI=<(9k4X?t$r=q$/!#

3lO+Jj$NBg7W2h$G$"$k!#7+$7!"3F!9$N%9%F%C%WrfC/jH?JsG$$$1$P!"$=$lDx:$FqJb$N $$!#

14.1 2?$r?t$(lP$h$$$+!)

4X?tDj5ANCfNC18l?t$r?t$(kKOI$&$7$?$i$h$$$+!"$r:G=i$K9M$(;O$a$?;~$K!"$^$:5?Ld$K;W$&3H $O!"9M$(kY$-$3$H) $O!"2f!9$O2?$r?t$(lP$h$$$+$H$$$&3HG"$k!# Lisp $N4X?tDj5A$K4X7FC18l$N OC$9>l9g!"<B:]KOBgDq%7%s%\%kN3Hr8@CF$$$k!#Nc$($P!"<!$N multiply-by-seven 4X?t$O!" defun multiply-by-seven!" number!" *!"$=$7$F 7$H$$$& 5 8D$N%7%s%\%k$r4^sG$$$k!#3l$K2C$($F@bL@J8;zN NCfK 'Multiply'!" 'NUMBER'!" 'by'!"$=$7$F 'seven' $H$$$&C18l$,4^$^lF$$$k!# 'number' $O7+$jJV7F ;Hol$F$$$kNG!"4X?tDj5ANCfK$O9g7W 10 8D$NC18l$H%7%s%\%k$,4^$^$l$F$$$k3HKJ$k!#

```
(defun multiply-by-seven (number)
  "Multiply NUMBER by seven."
  (* 7 number))
```

H3m,!"b7 multiply-by-seven $NDj5A$r C-M-h (mark-defun) $G%^!<%/$7$F!"$=3G count-words-region $r8F$S=P7F$_$k$H!" 10 8D$GOJ$/ 11 8D$NC18l$,$"kH$$$&Ez$($,5"CF$/$k!#2?$+$,$*$+$7$$!

<B$O!"LdBj$OFs=EKJCF$$$k!# count-words-region $O '*' $rC18l$H$O?t$($J$$$,!"5U$K!"0l$D$N%7 %\%k multiply-by-seven $r;0$D$NC18l$@$H?t$(F7$^$&NG$"$k!#%O%$%U%s$O0lDNC18lFbGNDJ$, $r<($9bNGOJ/!"C18l4V$N4V$N6uGr$HF1$8h&$K07$olkNG$"$k!#=>CF!" 'multiply-by-seven' 'multiply by seven' $H=q$+lF$$$kh&$K07$olk3HKJ$k!#$3Nh$&$J:.Mp$N860x$O!" count-words-region$NDj5AFb$G0lDNC18l$:$D0\F0$9$k:]$K;H$C$F$$$k@55,I=8=K"$k!#I8=`E*$J count-words-regio $N%P!<%8%g%s$G;Hol$F$$$k@55,I=8=$O

```
"\\w+\\W*"
```

G"$k!#$3$N@55,I=8=$O0l$D0J>eC18l9=@.J8;z$,B3$$$?8e$K 0 8D0J>e$NHsC18l9=@.J8;z$,B3$/$H$$$&%Q%?!<
$k!#!VC18l9=@.J8;z!W$KhC$F2?$,0UL#5lk+$H$$$&LdBj$O!"9=J8 (syntax) $NLdBj$KJk!#3lKO0l$
%/%7%g%s$r3dEv$F$FO@$8$k2ACM$,$"$k!#

14.2 C18l$d%7%s%\%k$O2?$+$i9=@.5l$F$$$k$+

Emacs GO!"3F!9$NJ8;z$O$"$k9=J8%+%F%4%j (*syntax categories*) $KB0$9kbNH7F07ol$k!#Nc$($P(
5,I=8= '\\w+' $O0l$D0J>e$N!VC18l9=@.J8;z!W (*word constituent*) $,B3$/%Q%?!<%s$rI=$7$F$$$k!#C18l9=@.
;z$H$$$&NO!"$"$k0lDN9=J8%+%F%4%j!<$NMWAG$N3HG"$k!#B>$N9=J8%+%F%4%j!<$NMWAG$O!"Nc$($P=*;
%s%^Ey$N6gFIE@J8;z$N%/%i%9!"%9%Z!<%9$d%?%VEy$N6uGrJ8;z$N%/%i%9$r4^sG$$$k!# (hj>\$7$$$3HK$D
Section "The Syntax Table" in *The GNU Emacs Manual*, 5Z$S Section "Syntax Tables" in *The GNU Emacs Lisp Reference Manual*, $r;2>H$N3H!#)

9=J8%F!<%V%kHOINJ8;z$,$I$N%+%F%4%j!<$KB0$9$k$+$rDjakbNG"$k!#IaDL!"%O%$%U%s$O!VC18l
;z!WKOJ,N`5l$J$$!#$=$&GOJ/!V%7%s%\%k$NL>A0$GO"k,!"C18lGO$J$$$bNN0lItrJ$9J8;z
%9!W$KJ,N`$5lk!#3l$O **count-words-region** 4X?t$,%O%$%U%s$rC18l4V$N6uGrJ8;z$HF1$807$$$r9k$3
$r0UL#$9$k!#$3l, **count-words-region** $, '**multiply-by-seven**' $r;0$D$NC18l$@$H?t$($kM}M3$G$"$k!#

Emacs $K **multiply-by-seven** $r0l$D$NC18l$@$H?t$(5;kKOFsD$NJ}K!$,$"$k!#0lDO9=J8%F!<%V%k$
=q49$($kJ}K!!"b&0lDO@55,I=8=$r=q$-D>$9J}K!$G$"$k!#

Emacs $,3F!9$N%b!<%IKBP7$F;}$D9=J8%F!<%V%k$r=q49$(k3HG!"%O%$%U%s$rC18l9=@.J8;z$@$H:FDj5
3H$,=PMh$k!#3NF0:n$O2f!9$NL\E*KKXs$I9g$&N@$,!"%O%$%U%s$@$1$,C18l$NCfKO8=l:%7%s%\%k$
=PF/$kJ8;z$H$$$&o1GO$J$$!#;w$?$h$&$JJ8;z$OB>$Kb"$k!#

Beoj$K!" **count-words** $NDj5ACf$N@55,I=8=$NJ}$r=q$-D>$7$F%7%s%\%k$r4^$`$h$&$K9k3H$b=PMh$k
Ai$NJ}K!$NJ}$,$h$j4JL@$G$"$k!#$?$@$7!"<B:]$Kdk3H$O>/!9%H%j%C%-!<$@!#

:G=i$NItJ,$O==J,$KC1=c$G$"$k!#%Q%?!<%sH7FO!V>/J/Hb0l$D0J>eB3$/!"C18l$J$$$7$O%7%s%\%k$N
AG!W$K%^%C%A$9kb$N!"$D$^$j!"

```
\\(\\w\\|\\s_\\)+
```

KJ$k!# '\\(' $O '\\w' $H '\\s_' $N$$$:l+$rI=$o$9@55,I=8=$N%0%k!<%W$N3+;O$r<($9ItJ,$G$"$k!#BP>]$
kFsD$NItJ,$O '\\|' $G6h@Z$ilF$$$k!# '\\w' OG0U$NC18l9=@.J8;z$K%^%C%A$7!" '\\s_'$O%7%s%\%kL>$N0
KJ$jF@$k$,!"C18l9=@.J8;z$GOJ$$$h$&$JG$0U$NJ8;z$K%^%C%A$9$k!#8e$KB3$/ '+' $O!"$3$N%0%k!<%W$KB0
;z!"B($AC18l$+%7%s%\%k$N9=@.J8;z$,>/$/$H$b0l2s$O%^%C%A7J1lPJiJ$$$3Hr0UL#9k!#

7+7J$,$i!"@55,I=8=$NFsHVL\$NItJ,ObCHFq$7$$!#M_$7$$$bNO!"0lHVL\$N@55,I=8=$KB3$1$F!VC1
ItKb%7%s%\%k$N0lIt$KbJiJ$$J8;z$,0l$D0J>eB3$$$Fb+$^$o$J$$!W3H$rI=$o$9I=8=$G$"$k!#$^$:;
$@$N$O<!$Nh&JbNG$"$k!#

```
\\(\\W\\|\\S_\\)*"
```

>e$NBgJ8;z$N 'W' $H 'S' $OC18l!"$J$$$7$O%7%s%\%k$N9=@.J8;zGO$J$$$h$&$JJ8;z$K%^%C%A$9$k!#$7$+$7!"$
8=GO!"C18l9=@.J8;zGO$J$$$+!"b7$/$O%7%s%\%k9=@.J8;zGO$J$$J8;z$K0lCW$7F7$^$&!#3lGO$
;zKb%^%C%A7F7^$&!#

<!$K;d$O!"%F%9%H7F$$$k%j!<%8%g%sFb$NA4$F$NC18l$d%7%s%\%k$N8e$K$O6uGrJ8;z (%9%Z!<%9!"%?%V!"$b
2~9T) $,$"k3HK5$$,$D$$$?!#$=$3$G!"C18l$+%7%s%\%k$N9=@.J8;z$,0l$D0J>eB3$/$H$$$&%Q%?!<%s$N8e$K
0J>e$N6uGrJ8;z$,B3$/$H$$$&%Q%?!<%s$rCV$$$F$_$?!#7+$7!"$3lb<:GT7?!#DL>o$OC18l$d%7%s%\%k$O6
okN@$,!"<B:]$N%3!<%IGO!"%7%s%\%k$N8e$K3g8L$,Mh$?$j!"C18l$N8e$K6gFIE@$,Mh$?$j9k3H$@$C$
$H$$$&o1$G!"7k6I!"C18l$+%7%s%\%k$N9=@.J8;z$N8e$K 0 8D0J>e$N6uGrJ8;z0J30$NJ8;z$,B3$-!"$=$N8e$K 0
$N6uGrJ8;z$,Mh$k!"$H$$$&%Q%?!<%sK9k3HK7?!#

<!$,$=$N@55,I=8=$G$"$k!#

```
"\\(\\w\\|\\s_\\)+[^ \t\n]*[ \t\n]*"
```

14.3 4X?t count-words-in-defun

0JA08+$?$h$&$K!" **count-word-region** 4X?t$r=q$/J}K!$O4v$D$+$"C?!#$,!":#2s **count-words-in-defun** $r=q$/:]KO!"3NFb$N0l$D$NJ}K!$@1r:NMQ9k3HK9$k!#

J}K!H7FO **while** %k!<%W$r;H$&J}K!$,M}2r$7d9$$$@m&$+$i!"3Air:NMQ9k3HK9$k!# **cou words-in-defun** $O!"$h$jJ#;($J%W%m%0%i%`$N0lIt$KJkNG!"%$%s%?%i%/%F%#%V$G$"$kI,MW$b!"%a%C%;!< =P$9I,MWbJ$/!"$?$@%+%&%s%H$rJV$7$5$($9lP$h$$!#3liN3H$r9MN8$9kH!"Dj5A$O>/$7C1=cKJ$k

0lJ}!" **count-words-in-defun** $O4X?tDj5A$r4^$`%P%C%U%!$NCf$G;H$olk!#=>CF!"8=:_%]%$%s%H$,4X?t 5AFbK"k+H=Dj$7!"$b7=$&$G$"$lP=$NDj5AFb$NC18l$r?t$(kH$$$&U&K9kN$,9gM}E*$G$"$m$&!" kH!"AgCH$3!<%I$,J#;(KOJk$,!"4X?t$K0z?t$rM?$($k<j4V$O>J1k!#

0J>eN3Hr9MN8$9$k$H!"%F%s%W%l!<%H$O<!Nh$&$KJk!#

```
(defun count-words-in-defun ()
  "documentation..."
  (set up...
     (while loop...)
   return count)
```

$$$DbDLj!"dkY-3HO3NCfN6u$-%9%m%C%H$rKdaF$$$/3HG"$k!#

$^$:$O set up $+$i!#

3N4X?t$O!"4X?tDj5A$,4^$^$l$k%P%C%U%!$NCf$G8F$S=P5lk3HrA[Dj5l$F$$$k!#8=:_$N%]%$%s%H$O 5A$NCfK"k+!"30K"k+IAi+G"$k!# **count-words-in-defun** $,F0:n$7F/lk$?$aKO!"%]%$% $,4X?tDj5A$N@hF,$K0\F0$7!"%+%&%s%?$,%<%m$+$i;O$^$j!"%]%$%s%H$,4X?tDj5A$N:G8eKMh?$i%k!<%W$,=*N $&$KJC$F$$$F$/$lJ1lPJi$J$$!#

beginning-of-defun 4X?t$O8eJ}$K8~$+$C$F9TF,$N '(' JI$N3+$-3g8L$r8!:w$7!"$=$3$K%]%$%s%H$r0\F0 k+!"8!:w$N8B3&$^$G0\F0$9$k!#<B:]KO!" **beginning-of-defun** $O%]%$%s%H$r8=:_%]%$%s%H$,4^$^lF$ 4X?tDj5Ab7$/$O%]%$%s%H0JA0$N%]%$%s%H$K:G$b6a$$4X?tDj5A$N3+;O0LCV!"0?$$$O%P%C%U%!$N@hF,$^$G0\F HKJk!#=>CF!" **beginning-of-defun** $r;H$&3H$GK>$_$N0LCV$^$G%]%$%s%H$r0\F0$9k3H,=PMh$k!#

while %k!<%WGO!"?t$($?C18l$d%7%s%\%k$N?t$rJ];}$7F*$/%+%&%s%?$,I,MWG"$k!# **let** <0$KhC$F!" L\E*$N$?$a$NJQ?t$r:n$j!"$=NCMr%<%m$K=i4|2=$9k3H,=PMh$k!#

end-of-defun 4X?t$O **beginning-of-defun** $HF1$8h&$JF/$-r9kN$@$,!"%]%$%s%H$r4X?tDj5A$N=*N; 0LCV$K0\F0$9$kE@$@$1$,0[$JCF$$$k!# **end-of-defun** $O4X?tDj5A$N=*N;0LCV$r7hDj$9$k#S<0$N0lItH7$F 3H$,=PMh$k!#

$H$$$&3H$G!" **count-words-in-defun** $N set up ItJ,$O$"$C5j=q1F7^$&!#$^$:$O!"4X?tDj5A$N:G= $K%]%$%s%H$r0\F0$7!"<!$K%+%&%s%?$N$?$a$N6I=jJQ?t$rMQ0U$7!":G8e$K **while** %k!<%W$,;_$^kY$-=j$G;_ h&$K4X?tDj5A$N=*N;0LCV$r5-O?$7F*$/$NG"$k!#

%3!<%I$O<!$NDLjG$"$k!#

```
(beginning-of-defun)
(let ((count 0)
      (end (save-excursion (end-of-defun) (point))))
```

3N%3!<%I$OC1=c$G$"$k!#AgCHdd$3$7$$$N$O **end** $K4X$9kH3m$@$m$&!#$3lK$O!"4X?tDj5A$N=* $,%P%$%s%I5l$k!#$=$N:]!" **save-excursion** <0NCfG0l;~E*$K **end-of-defun** $G4X?tDj5A$N=*N;0LCV$K0 F0$7$?8e$K%]%$%s%H$N0LCVrJV9$H$$$&J}K!$rMQ$$$F$$$k!#

5F!" **count-words-in-defun** $N set up $KB3$/FsHVL\$NItJ,$O **while** %k!<%W$G$"$k!#

3N%k!<%WGO!"%]%$%s%H$rC18l$d%7%s%\%k$4HK0\F0$9$k#S<0!"5Z$S$8%c%s%W$N2s?t$r5-O?9k$,I, $k!#$^$?!" **while** %k!<%W$N??56%F%9%HGO!"%]%$%s%H$,$^$@%8%c%s%W9Y$-$J$i??$rJV$7!"Dj5A$N=*N;0L E~C#7?Ji56rJV9h&JbNG$"$kY-G"$k!#L\E*$N$?$a$N@55,I=8=$O4{$K:FDj5A$7F7$^$C$F$$$ (Section 14.2, "C18l$d%7%s%\%k$O2?$+$i9=@.5l$F$$$k$+", p. 120, ;2>H) %k!<%W$O4JC1$K=q$1$k!#

```
(while (and (< (point) end)
            (re-search-forward
             "\\(\\w\\|\\s_\\)+[^ \t\n]*[ \t\n]*" end t)
  (setq count (1+ count)))
```

4X?tDj5A$N;0HVL\$NItJ,$OC18l$d%7%s%\%k$N?t$rJV$9ItJ,$G$"$k!#3NItJ,$O **let** <0$NK\BNItJ,$N:G8e$
$@$,!"6KaFC1=c$K6I=jJQ?t **count** $r=q$$$F$*$/$@$1Gh$$!#3l$rI>2A$9kH?t$,JV$ko1G"$k!#

0J>er^HakH!" **count-words-in-defun** $O<!$Nh&KJ$k!#

```
(defun count-words-in-defun ()
  "Return the number of words and symbols in a defun."
  (beginning-of-defun)
  (let ((count 0)
        (end (save-excursion (end-of-defun) (point))))
    (while
        (and (< (point) end)
             (re-search-forward
              "\\(\\w\\|\\s_\\)+[^ \t\n]*[ \t\n]*"
              end t))
      (setq count (1+ count)))
    count))
```

3l$r%F%9%H$9kKOI$&$7$?$i$h$$$@m&$+!#$3$N4X?t$O%$%s%?%i%/%F%#%V$GOJ$$$,!"AgCH#S<(
$;$k3H$G4JC1$K interactive K9k3H,=PMh$k!#$3lK$O **count-words-region** $N:F5"4X?tHG$H$[$\F1$
%3!<%I$,;H$($k!#

```
;;; %$%s%?%i%/%F%#%V%P!<%8%g%s
(defun count-words-defun ()
  "Number of words and symbols in a function definition."
  (interactive)
  (message
   "Counting words and symbols in function definition ... ")
  (let ((count (count-words-in-defun)))
    (cond
     ((zerop count)
      (message
       "The definition does NOT have any words or symbols."))
     ((= 1 count)
      (message
       "The definition has 1 word or symbol."))
     (t
      (message
       "The definition has %d words or symbols." count)))))
```

JX59>e **C-c =** $H$$$&%-!<%P%$%s%G%#%s%0$rb&0lEY;H$&$3HK7h$&!#

```
(global-set-key "\C-c=" 'count-words-defun)
```

0J>e$G!" **count-words-defun** $r%F%9%H$9k?aN=`Hw$,@0$C$?!#$^$:$O!" **cout-words-in-defun** 5Z$S
count-words-defun $rN>J}$H$b%$%s%9%H!<%k7F!"%-!<%P%$%s%G%#%s%0$N@_Djb7F7$^$*$&!#$=7F!"%
%=%k$r<!$NDj5ANCfK0\F0$7$F<B83$7$F$_$k!#

```
(defun multiply-by-seven (number)
  "Multiply NUMBER by seven."
  (* 7 number))
    ⇒ The definition has 10 words or symbols.
```

@.8y$@!* 3NDj5ANCfK$O3N$+$K 10 8D$NC18l$H%7%s%\%k$,$"$k!#

<!$NLdBj$O!"0lDN%U%!%$%k$NCf$N4v$D$+$NDj5AK"$kC18l$H%7%s%\%k$N?t$r?t$($k3HG"$k!#

14.4 0lDN%U%!%$%k$K$"$kJ#?t$N **defun** $r?t$($k

'simple.el' Nh$&$J%U%!%$%k$NCfKO 80 0J>e$N4X?tDj5A$,4^$^$l$F$$$?j9$k!#2f!9$N:G=*E*$JL\I8$
;3$N%U%!%$%kKD$$$F$NE}7W$r<hk3HG$"$k$,!"$=$N:G=i$N%9%F%C%WH7$F!"$^$:$O0lDN%U%!%$%k$K$
E}7W$r<h$k3H$rL\I8$K7h$&!#

>pJs$O?t$NNs$N7A$GM?$($i$l!"3F!9$N?t$O4X?tDj5A$ND9$5$KJk!#3liN?t$O%j%9%H$NCf$KJ];}$7F
$,=PMh$k!#

0lDN%U%!%$%k$K$D$$$F$N>pJs$O:G=*E*KOB?$/$N%U%!%$%k$K$D$$$F$N>pJs$N7A$KE}9g$5lk3HKJ$
$F!"$3$3$G:n@.9k0lDN%U%!%$%kFb$N4X?tDj5A$ND9$5$r?t$($k4X?t$OC1$K!VD9$5!W$N%j%9%H$rJV9@1
FC$K%a%C%;!<%8$H$+$rI=<(9kI,MWOJ$$!#

C18l$r?t$($k%3%^%s%I$K$O!"C18l$4HK%]%$%s%H$rA0J}$K?J$a$k#S<0$H%8%c%s%W$N2s?t$r?t$($k#S<0$,4
$$$?!#Dj5A$ND9$5$rB,$k4X?t$b!"F1$8h&$K@_7W$9k3H,=PMh$k!#$3$N>l9g$ODj5A4H$K%]%$%s%H$r?J$
$HD9$5$N%j%9%H$r:n@.9kh&$J#S<0$,4^$^$lk3HKJk!#

LdBjr3Nh$&$K8@$$BX$($F7^$($P!"4X?tDj5A$r=q$/NO4JC1J3HG$"$k!#L@i+$K!"%+%&%s%H$C
%k$N@hF,$+$i;O$aJ1lPJi$J$$!#=>CF!":G=i$N%3%^%s%I$O **(goto-char (point-min))** G"$k!#<!$
while %k!<%W$KF~$k!#$3$3GO!"%k!<%W$N??56%F%9%H$O<!$N4X?tDj5A$rC5$9@55,I=8=$K<hlk — 8!:w$,@
$F$$$k4V$O%]%$%s%H$r?J$a!"K\BN$rI>2A$9ko1G$"$k!#K\BNFb$K$OD9$5$N%j%9%H$r:n@.$9$k#S<0$,I,MW$
3lKO **cons** $H$$$&%j%9%H$r9=@.$9$k%3%^%s%I$,;H$($k!#dkY-3HNKXI$O!"0J>e$G=*oC$F$$$k!#

ItJ,E*$K%3!<%I$r=q$/$H<!Nh$&$KJk!#

```
(goto-char (point-min))
(while (re-search-forward "^(defun" nil t)
  (setq lengths-list
        (cons (count-words-in-defun) lengths-list)))
```

3NB>Kdk3HO!"4X?tDj5A$r4^$`%U%!%$%k$r8+D1k3HG$"$k!#

:#$^$GNNcG$O!"$3$N Info file $r;H$&$+!"'***scratch***' %P%C%U%!JI$NB>$N%P%C%U%!$K0lC6La$C$F!"$^
5"CF$/$k$H$$$&3H7+7F$$$J$+$C$?!#

%U%!%$%k$r8+D1$k (find) 3H$O!"3NJ8=qGO=iaF=PF/$k%W%m%;%9G"$k!#

14.5 %U%!%$%k$r8+D1$k

$^$:$O!" **find-file** $N%=!<%9$r8+F_h&!# (4X?t$N%=!<%9$O **find-tag** $r;H$&$H8+$D1k3H$,=PMh$k!

```
(defun find-file (filename)
  "Edit file FILENAME.
Switch to a buffer visiting file FILENAME,
creating one if none already exists."
  (interactive "FFind file: ")
  (switch-to-buffer (find-file-noselect filename)))
```

Dj5AKO!"4J7i$J@bL@J8;zNs$,IU$$$F$*$j!"%$%s%?%i%/%F%#%V<0$G$OBPOCE*$KMQ$$$?;~$N%W%m%s%W%H$,;X
$F$$$k!#$G!"Dj5A$NK\BN$r8+$k$H!" **find-file-noselect** 5Z$S **switch-to-buffer** $H$$$&FsDN4X?t$,;H
ol$F$$$k!#

C-h f (**describe-function** %3%^%s%I) $GI=<($5lk@bL@KhkH!" **find-file-noselect** $O;XDj$5l?
%U%!%$%k$r%P%C%U%!KFI_9~$_!"$=$N%P%C%U%!$rJV$9!#$7$+$7J,$i%P%C%U%!$OA*Br5l$J$$!"D^$j Em
Cm0Ur=$N%P%C%U%!$K$O8~$1$J$$!# (0?$$$O **find-file-noselect** $rL>A0$N$D$$$?%P%C%U%!$KBP$7;HC?>
$O!"$"J?$NCm0U$b0z$+$J$$!#) 3N;E;v$O **switch-to-buffer** $,$dCF$/$l$k!#$3$N4X?t$O!" Emacs $,Cm
9k%P%C%U%!$r;XDj$9kbNG$"$k!#99K3$N4X?t$O!"%&%#%s%I%&$KI=<($5lF$$$k%P%C%U%!$r?7$7$$%P%
@ZjBX($k!#%P%C%U%!$N@ZjBX(KD$$$F$O!"$^$?JL$N>l=j$G5DO@$9k3HK7h$&!# (Section 2.3, "%P%C
4V$N0\F0", p. 17, ;2>H!#)

:#dm$&$H7F$$$k%R%9%H%0%i%`7W2hGO!"Dj5A$ND9$5$rD4$Y$k:]$K$$$A$$$A0l$D0l$D$N%U%!%$%k$r%9%
$KI=<($9kI,MWO$J$$!#$H$$$&o1$G **switch-to-buffer** GOJ/ **set-buffer** $r;H$&3HK7h&!#3
$b Emacs $,CmL\$9$k%P%C%U%!$r@ZjBX(kN$@$,!"%9%/%j!<%s$KI=<($9$k%P%C%U%!$O$=$N$^$^G"$k!#=>$
2f!9$NL\E*$N$?$aKO **find-file**$O;H$($:!"$=N?aN%3!<%I$r=q$/3HKJ$k!#

$H$$$CFb!"dk3H$O4JC1$@!#C1$K **find-file-noselect** $H **set-buffer** $r;H$(Ph$$$NG"$k!#

14.6 lengths-list-file KD$$$F$N>\:Y

length-list-file 4X?t$N3K?4ItJ,$O!" defun $+$i defun $X0\F0$7$F$$$/4X?t$r4^$` **while** %k!<%W$H!"
3F!9$N defun NCfK4^$^lkC18l$d%7%s%\%k$N?t$r?t$($k4X?tG"$k!#$=7F$=$N<~JU$K!"Nc$($P!"%U%!%
8+D1$?$j!"%]%$%s%H$,I,$:%U%!%$%k$N@hF,ItJ,$+$i%9%?!<%H$9kh$&$K7?j9$k!"$H$$$C$?B>$NMM!9$
9k4X?t$,Mh$k!#7k6I!"Dj5A$O<!$Nh&KJ$k!#

```
(defun lengths-list-file (filename)
  "Return list of definitions' lengths within FILE.
The returned list is a list of numbers.
Each number is the number of words or
symbols in one function definition."
  (message "Working on `%s' ... " filename)
  (save-excursion
    (let ((buffer (find-file-noselect filename))
          (lengths-list))
      (set-buffer buffer)
      (setq buffer-read-only t)
      (widen)
      (goto-char (point-min))
      (while (re-search-forward "^(defun" nil t)
        (setq lengths-list
              (cons (count-words-in-defun) lengths-list)))
      (kill-buffer buffer)
      lengths-list)))
```

3N4X?t$O0l$D$N0z?t$r<h$k!#$3lO:n6HBP>]HJ$k%U%!%$%k$NL>A0$G$"$k!#@bL@J8;zNs$O;M9T$"k,!"%
%/%F%#%V@k8@O5lF$$$J$$!#K\BN$N0l9TL\$G$O!";H$C$??M$,7W;;5!$,2u$l$?$NGO$J$$$+$H?4G[$7$J$$$
:G=i$K2?$rdC$F$$$k$+$rI=<(9kh&K7$F$$$k!#

<!$N9T$G **save-excursion** $,;H$olF$$$kNG!" Emacs $O;E;v$,=*oC$?8e!"$Acs$H85$N%P%C%U%!$K
0UrLa7F/lk!#3&9k$H!"$3$N4X?t$rB>$N4X?t$NCfKKda9~sG$$$k>l9gJIKb!"%]%$%s%H$r85$
La7F$/$lkN$GJXMx$G$"$k!#

let <0$NJQ?t%j%9%H$N=j$G!" Emacs $O%U%!%$%k$r8+$D1F6I=jJQ?t **buffer** r=$N%U%!%$%k$rCf?H$H$
%P%C%U%!$K%P%$%s%I9k!#F1;~$K Emacs $O **lengths-list** $r6I=jJQ?t$H7F@8@.9k!#

<!$K Emacs $OCm0U$r$=$N%P%C%U%!$K8~$1$k!#

<!$N9T$G$O Emacs $O%P%C%U%!$rFI$_=P$7@lMQK7$F$$$k!#M}O@>e$O!"$3$N9T$OITMWG"$k!#4X?tDj5AFb$
$d%7%s%\%k$N?t$r?t$($k4X?t$NCf$G!"%P%C%U%!$r=q49$($?j9kh$&$JbNOJ$$$7!"Nc$($=$N%P%C%U%!$
1?H7FbJ]B8$5$1$?$jO7$J$$!#3&$$$&7Y2|r9kN$O!"$3$1$i$N4X?t$, Emacs $N%=!<%9>e$G:n6H$
aK!"K|$,01$KGb$U%!%$%k$r=$@5$7$F7^C?j9kHHs>o$KITET9g$G$"$k$H$$$&M}M3N?aG$"$k!#8
bJ$$$,!";d<+?H$O<B83$,<:GT7F;d$N Emacs $N%=!<%9%U%!%$%k$,=$@5$5$1kJsF$$$&;vBV$K2q$o$J$$$
3N9T$,I,MW$@$H;W$&3HOJ$$$$@m&!#

<!$K!"%P%C%U%!$,%J%m!<%$%s%0$5$1$F$$$k>l9gKO!"$=$1$r9-$2kH$$$&3HrdCF$$$k!#$3$1$OIaDI
$J$$ —Emacs O=$N%U%!%$%k$KBP1~$9kP%C%U%!$,L5$$>l9g$O?75,$K%P%C%U%!$r3+$/$+$i$@!#$7$+$7!"4{$
>l9gKO Emacs O=$N%P%C%U%!$rJV$9!#$3$N>l9g!"$b7=$N%P%C%U%!$,%J%m!<%$%s%0$5$1$F$$$?Ji!"$=$
=|9kI,MW$,$"$k!#??$K%f!<%6!<%U%l%s%I%j!<$J4X?t$K7?$$>l9gKO!"%J%m!<%$%s%0$d%]%$%s%H$N0LCV$
J]B8$7$F$*$/Y-$@$m$&$,!"$3$3GO2?b7$J$$$3HK9k!#

(goto-char (point-min)) <0$G%]%$%s%H$r%P%C%U%!$N@hF,$K0\F0$9$k!#

$=$7$F while %k!<%W$,Mh$k!#$3$3$G!"3N4X?t$N;E;v$,<B9T$5$1k3HKJk!#3N%k!<%WGO!" Emac
3F!9$NDj5A$ND9$5$rD4$Y!"$=$ND9$5$N%j%9%H$r:nCF$$$/!#

$"$k%P%C%U%!GN:n6H$,=*$okH Emacs O=$N%P%C%U%!$r kill 9k!#$3$1$O!" Emacs FbIt$G$N%9%Z!<%
@aLsN?aG$"$k!#;d$,;H$C$F$$$k Emacs 19 $N%P!<%8%g%s$K$O 300 0J>e$b$N%=!<%9%U%!%$%k$,4^$^1F$*
$3$1iK lengths-list-file $,E,MQ$5$1$k!#b7 Emacs $,$3$1$iA4FrFI$_9~$s$G01$D$b kill 7J$+C
$i!";d$N7W;;5!$O2>A[5-21$r;H$$@ZCF7^$&$@m&!#

=*j^GMhk$H!" let <0$NCf$N:G8e$N#S<0G"$k lengths-list$H$$$&JQ?t$,I>2A$5$1$k!#3NCM$,4X?
BNNCMHJk!#

3N4X?t$r$$$DbDLj%$%s%9%H!<%k$7$F;n$7F_k3H,=PMh$k!#%$%s%9%H!<%k$,=*$oC?$i!"%+!<%=%
#S<0$ND>8e$K;}CF$$$CF+$i C-x C-e (eval-last-sexp) $H%?%$%W7F!"I>2A7F$_$h$&!#

```
(lengths-list-file "../lisp/debug.el")
```

(B?J,!"%U%!%$%k$N%Q%9L>$rJQ99$9kI,MW,$"$k$@$m$&!#>e$K5s2?bN$O!"$3$N Info %U%!%$%kN"$k%G%#
%j$H Emacs $N%=!<%9$,$"$k%G%#%l%/%H%j$, /usr/local/emacs/info $H /usr/local/emacs/lisp NH
$&$KNYF1;NK"$k>l9g$@1G$"$k!#JQ99$9$k>l9g$O!"$3$N#S<0$r01C6 '*scratch*' %P%C%U%!$K%3%T!<$7F
$=$1$r=$@5$7$FI>2A9k!#)

;d$,;H$C$F$$$k%P!<%8%g%s$N Emacs GO!" 'debug.el' $N list $ND9$5$rD4$YkN$K 7 IC$+$+$j!"7k2L$O<!
h&KJC?!#

```
(75 41 80 62 20 45 44 68 45 12 34 235)
```

%U%!%$%k$NCf$N:G8e$NDj5A$ND9$5$O!"%j%9%H$N:G=i$K8=$1k3HKCm0U7h$&!#

14.7 0[Jk%U%!%$%k$NCf$NDj5A$r?t$($k

A0@aGO!"3F%U%!%$%k$NCf$K4^$^1k3F4X?t$ND9$5$N%j%9%H$rJV9h$&$J4X?t$r:n@.$7$?$N$@$C$?!#:#
%U%!%$%k$N%j%9%H$,M?$(i1$?;~$K!"$=$1iN%U%!%$%k$NCf$N4X?t$ND9$5$N%^%9%?!<%j%9%HrJV9h&$J4
5A7F$_$?$$!#

%j%9%HNCfN3F%U%!%$%k$KBP9k:n6H$O7+$jJV7NF0:nJN$G!" while%k!<%W$d:F5"$r;H$C$F9T$&3H$
$k!#

while %k!<%W$r;H$C$?J}K!$O%k!<%F%#!<%s%o!<%/G"$k!#4X?t$KEO9z$-?t$O%U%!%$%k$N%j%9%HKJ$k!
8+$?$h$&$K (Section 11.1.1, "%k!<%W$NNc", p. 83 ;2>H)!"$3$N%j%9%H$,MWAG$r4^$s$G$$$k;~N_%k!<%W$NK\B
<B9T$7!"MWAG$,L5$/$JC?$iH4$1kh$&$K9k3H$,=PMh$kNG$"$C$?!#$3$1$,$&$^$/F0:n$9k?aK$O!
J,$G!"K\BN$,012sI>2A$5$1k4HK3N%j%9%H$rC;$/7F$$$-!"7k2LH7$F:G8e$K$O%j%9%H$,6uKJkh$
<0$r=q$$$F$*$/I,MW$,$"$k!#$3N?aK$O!"K\BN$,I>2A$5$1k4HK!"%j%9%HK=$N%j%9%H$N CDR NCMr
9k$H$$$&5;K!$rMQ$$$kN,IaDLG"$k!#

%F%s%W%l!<%H$O<!$Nh&KJ$k!#

```
(while test-whether-list-is-empty
  body...
  set-list-to-cdr-of-list)
```

5F!" **while** %k!<%W$O>o$K (??56%F%9%H$N7k2L$H7F) **nil** rJV7!"K\BNFb$N#S<0$NCMrJV7$?$j9k$3
$J$$$N$@$C$?!# (=>$C$F!"%k!<%W$NK\BN$N#S<0$OI{:nMQH7$FI>2A$5lk!#) 7+7J$,$i!"D9$5$N%j%9%H
%H9k#S<0$OK\BN$N0lItG"$k — Kb$+$+oi$:!"$=$N4X?tA4BN$NCMH7FJV7$FM_$7$$$Nb3NCMG$"
3G!" **while** %k!<%W$r **let** <0$GJqsG!" **let** <0$N:G8e$NMWAG$,D9$5$N%j%9%H$NCM$r4^$`h&K9$k!# ("A}
$k%+%&%s%?$r;HC?%k!<%W$NNc", p. 85, $r;2>H!#)

0J>eN3Hr9M$($l$P!"L\E*$N4X?t$,KX$I=q1F7^$&!#

```
;;; while %k!<%W $r;H$&!#
(defun lengths-list-many-files (list-of-files)
  "Return list of lengths of defuns in LIST-OF-FILES."
  (let (lengths-list)

;;; ??56%F%9%H
    (while list-of-files
      (setq lengths-list
            (append
             lengths-list

;;; D9$5$N%j%9%H$N@8@.
             (lengths-list-file
              (expand-file-name (car list-of-files)))))

;;; %U%!%$%k$N%j%9%H$rC;$/$9$k!#
      (setq list-of-files (cdr list-of-files)))

;;; %j%9%H$ND9$5$N:G=*E*$JCM$rJV$9!#
    lengths-list))
```

expand-file-name $O built-in 4X?t$G$"$j!"%U%!%$%kL>$r@dBP%Q%9$b4^$a$?>JN,L5$7$N7A$KLa9bNG$
$k!#=>$C$F!"Nc$($P

```
debug.el
```

$O

```
/usr/local/emacs/lisp/debug.el
```

$HE83+$5lk!#

$=$NB>$N!">e$N4X?tFb$K=P$F$/$k?7$7$$MWAG$O **append** $@$1G"$k!#$3lK$O0l$D$N%;%/%7%g%s$r3dEv$
$,NI$$$@m&!#

14.7.1 4X?t append

append 4X?t$O!"$"$k%j%9%H$r!"b&0lDN%j%9%H$KDI2C$9kbNG$"$k!#Nc$($P!"

```
(append '(1 2 3 4) '(5 6 7 8))
```

$N7k2L$O<!Nh$&$KJk!#

```
(1 2 3 4 5 6 7 8)
```

`lengths-list-file` KhCF:n@.5l$?Fs$D$ND9$5$N%j%9%H$r0lDK$^$Hak:]$O!"$3Nh$&$J7AKJC
$7$$$N$@$C$?!# `cons` $r;H$C$?>l9g$HHf3S7F$_$h$&!#

```
(cons '(1 2 3 4) '(5 6 7 8))
```

3CA@$H!" `cons` $N:G=i$N0z?t$,=PMh$?%j%9%H$N:G=i$NMWAGKJCF7^$&!#

```
((1 2 3 4) 5 6 7 8)
```

14.8 0[Jk%U%!%$%k$NDj5A$r:F5"$r;HCF?t$($k

`while` %k!<%WGOJ/:F5"$r;H$CFb3F!9$N%U%!%$%k$N%j%9%H$KBP7F:n6H9k3H$,=PMh$k!#:F5"$r;
`lengths-list-many-files` $OC;$/$FC1=c$J7Ar7$F$$$k!#

:F5"4X?t$O!"IaDL$O 'do-again-test'!" 'next-step-expression'!"$=$7$F:F5"8F$S=P7NItJ,$+$iJC$F$$$k!#
'do-again-test' GO!"3N4X?t$,<+J,<+?H$rb&0lEY8F$S=P$9$+$I$&$+$r7hDj$9$k!#:#$N>l9g$O `list-o`
`files` $,$^$@;D$j$NMWAG$r;}CF$$$k$+$I$&$+$rD4$Yk3HKJk!# 'next-step-expression' GO!" `list-`
`of-files` r=$l<+?H$N CDR GCV-49$($k!#7k2LH7$F:G8e$K$O%j%9%H$O6uKJ$k!#<B:]$N40A4$J%3!<%I
3N@bL@hj$bC;$$!*

```
(defun recursive-lengths-list-many-files (list-of-files)
  "Return list of lengths of each defun in LIST-OF-FILES."
  (if list-of-files                      ; do-again-test
      (append
       (lengths-list-file
        (expand-file-name (car list-of-files)))
       (recursive-lengths-list-many-files
        (cdr list-of-files)))))
```

0l8@$G8@$&$H!"$3$N4X?t$O `list-of-files` $N:G=i$N%U%!%$%k$K$D$$$F$ND9$5$N%j%9%H$r!" `list-of-file`
$N;D$j$r0z?t$K<+J,<+?H$r8F$S=P7?7k2L$KDI2C$7$F$$$k!#

<B:]$K!"3F%U%!%$%kKBP7$F `lengths-list-file` rAvi$;J,$i `recursive-lengths-list-many-`
`files` $r%F%9%H$7F_kK$O!"<!$Nh&K9$k!#

$^$:!"$^$@dC$F$$$J1l$P `recursive-lengths-list-many-files` $H `lengths-list-files` $r%$
%s%9%H!<%k$7 (LuCp!' `count-words-in-defun` $b%$%s%9%H!<%k9kI,MW$,$"$k)!"$=$N8e!"<!$K5s2k#S<
$rI>2A$9$k!#$?$@$7!"%U%!%$%k$N%Q%9L>$OJQ99$9kI,MW,$"$k$+$b7l$J$$!#0J2<$N<0$G$O!" Info %U%!%
Emacs $N%=!<%9%U%!%$%k$,DL>o$N0LCV$KCV$$$F$"$k>l9g$KM-8z$G$"$k!#3l$rJQ99$7$?$$>l9g$O!"$3li$
'`*scratch*`' %P%C%U%!$K$3%T!<7F!"$=$lirJT=8$7$?8e!"I>2A9lPh$$!#

7k2L$O ⇒' $N8e$K<(5l$F$$$k!# (3liN7k2L$O Emacs version 18.57 KD$$$FNbNG$"$k!#B>$N%P!<
%8%g%s$N Emacs KD$$$F$O!"$^$?JL$N7k2L$,=P$k3H$@$m$&!#)

```
(lengths-list-file
 "../lisp/macros.el")
    ⇒ (176 154 86)

(lengths-list-file
 "../lisp/mailalias.el")
    ⇒ (116 122 265)

(lengths-list-file
 "../lisp/makesum.el")
    ⇒ (85 179)
```

```
(recursive-lengths-list-many-files
 '("../lisp/macros.el"
   "../lisp/mailalias.el"
   "../lisp/makesum.el"))
     ⇒ (176 154 86 116 122 265 85 179)
```

3Nh&$K **recursive-lengths-list-many-files** $O4|BT$7$?7k2L$rJV7F$/$lkO$:$@!#

<!$N%9%F%C%W$O!"7k2L$r%0%i%U$KI=<(9k$?$a$N%G!<%?$N%j%9%H$r=`Hw$9k3HG$"$k!#

14.9 %G!<%?$r%0%i%U$KI=<(9k$?$a$N=`Hw

recursive-lengths-list-many-files 4X?t$O!"?t$N%j%9%HrJV9!#3F!9$N?t$O4X?tDj5A$ND9$5$N5-O?$G
$"$k!#2f!9$,$3l+idiMPJiJ$$$N$O!"$3$N%G!<%?$r%0%i%U$NI=<($KE,7?7A$N?tCM$N%G!<%?$KJQ4
HG$"$k!#?7$7$/=PMh$k%j%9%H$+iO!" 10 hj>/$J$$C18l$d%7%s%\%k$7$+4^$^$J$$4X?tDj5A$,$Il@1"
$+!" 10 $+$i 19 $d!" 20 $+$i 29 $^$GJi$^$GGOI&$+Ey$H$$$&3H$,J,$kh&KJ$k!#

<jC;$K8@$&$H!" **recursive-lengths-list-many-files** 4X?t$,@8@.$7$?%j%9%H$r8+$F$$$C$F!"3F!9$NHO
0O$KF~$k4X?t$,$Il@1"k+$r?t$($F!"$=li$N?t$N%j%9%H$r:n$m$&$H$$$&NG$"$k!#

3l$^$G$N7P83$+$i!"D9$5$N%j%9%H$r 'CDR' 7D$D3F!9$NCM$r8+$F$$$-!"$=$l$,$I$NHO0O$KF~kN$+$rD
$=$NHO0OKD$$$F$N%+%&%s%?$rA}d94X?t$r=q$/3H$O!"FC$KFq7/OJ$$$bNH;!7,D/$@$m$&!#

7+7J$,$i!"<B:]$K4X?t$r=q$-2<$9A0$K!"D9$5$N%j%9%H$r$^$:%=!<%H7F!">/$J$$J}$+$iBg$-$$J}$KJ
HKhC$FF@$ilk%a%j%C%HKD$$$F9M$($kY-G"$k!#$^$:!"%=!<%H$9k3HG!"3F!9$NHO0O$KB0$9$k4
$r?t$(kN$,3Z$KJk!#3l$ONYF1;N$N?t$OF1$8HO0O$KB0$9k+NYF1;N$NHO0O$KB0$9$k$+$IAi$+$KJk$
$k!#$^$?!"%j%9%H$r%=!<%H7F7^$($P:GBg$N?t$H:G>.$N?t$r4JC1$K8+$D1k3H$,=PMh$k!#$^$?$=$3$+$
I,MWHJ$k:GBg$H:G>.$N:9$b7hDj=PMhk3HKJk!#

14.9.1 %j%9%H$N%=!<%H

Emacs $O **sort** $H8F$Plk%j%9%H$r%=!<%H$9k?aN4X?t$r;}$C$F$$$k!# **sort** 4X?tOFsD$N0z?t$r;}$
%=!<%H5lkY$-%j%9%H$H!"FsDNMWAG$NBg>.$rHf3S9k:]$N=R8l (predicate) G"$k!#

0JA0@bL@7?h&$K (Section 1.8.4, "4X?t$K4V0cC?%?%$%W$N0z?t$rM?$(kH", p. 9, ;2>H)!"=R8lHO!"$"
@-<A$,??$+56$+$rH=CG9k4X?tN3HG$"$k!# **sort** 4X?t$O!"%j%9%H$NMWAG$r=R8l$,;HMQ9k@-<A$K=>$C$F
$($k!#3l$O!"?tCM0J30$N%j%9%H$b!"?tCM0J30$N4p=`$G — Nc$($P%"%k%U%!%Y%C%H$N=gHV$G — **sort** $rMxMQ$
$Y49$(k3H,=PMhk3Hr<(7F$$$k!#

?tCM$GHf3S$9$k:]$K$O < 4X?t$,;Hol$k!#Nc$($P!"

```
(sort '(4 8 21 17 33 7 21 7) '<)
```

$N7k2L$O<!Nh$&$KJk!#

```
(4 7 7 8 17 21 21 33)
```

(3NNcGO!"0z?t$, **sort** KEO5lk:]$KI>2A$5lJ$$$h$&$K!"IAiN%7%s%\%kKb0zMQId$,IU$$$F$$$
$KCm0U$7h&!#)

recursive-lengths-list-many-files 4X?tKhCFJV5l$?%j%9%H$r%=!<%H9kNO4JC1G"$k!#

```
(sort
 (recursive-lengths-list-many-files
  '("../lisp/macros.el"
    "../lisp/mailalias.el"
    "../lisp/makesum.el"))
 '<)
```

H9k@1@!#7k2L$O<!$Nh&KJ$k!#

```
(85 86 116 122 154 176 179 265)
```

(3NNcGO **sort** $N:G=i$N0z?tKO0zMQId$,$D$$$F$$$J$$!#3l$O!" **sort** KEO5lkA0K3$N#S<0$rI>
$F!"%j%9%H$r@8@.9kI,MW$,$"k+iG$"$k!#)

14.9.2 %U%!%$%k$N%j%9%H$N:n@.

recursive-lengths-list-many-files 4X?t$O0z?t$H7F%U%!%$%k$N%j%9%HrI,MWH9k!#3l$^$G<B83
7?NcGO!"3liN%j%9%H$O<j$G:nCF$$$?!#7+$7!" Emacs Lisp $N%=!<%9%G%#%l%/%H%j$OBgJQBg$-
$G!"$3li$r0l!9<j$G=q$$$F$$$ko1KO$$$+$J$$!#$=$3$G!"Be$ojK **directory-files** 4X?t$r:n$C$F!
Nh$&$J%j%9%H$r:n@.$9kI,MW,$"$k!#

directory-files 4X?t$O!";0$D$N0z?t$r<h$k!#:G=i$N0z?t$O%G%#%l%/%H%j$NL>A0G"$j!"J8;zNs$G$"$k!
HVL\$N0z?t$, non-nil Ji!"3N4X?t$O%U%!%$%k$N@dBP%Q%9L>rJV9!#;0HVL\$N0z?tKO **nil** $+@55,I=8=
Dj9k!#@55,I=8=$r;XDj$7$?>l9g!"$=lK%^%C%A9k%Q%9L>$r;}$DbN$@$1$,JV$5lk3HKJ$k!#

(LuCp!' Version 19 $+$i$O0z?t$N?t$O;M$DKJC?!#;MHVL\$N0z?t$, non-nil Ji7k2L$O sort 5l$J$$!#

=>CF!"Nc$($P;d$N%7%9%F%`$G

```
(length
 (directory-files "../lisp" t "\\.el$"))
```

HdkH!";d$N version 19.25 $N Lisp $N%=!<%9%G%#%l%/%H%j$K$O 307 $N '.el' %U%!%$%k$,$"k3H,J,$k!
recursive-lengths-list-many-files $,JV$9%j%9%H$r%=!<%H$9k?aN#S<0$O<!$Nh&KJ$k!#

```
(sort
 (recursive-lengths-list-many-files
  (directory-files "../lisp" t "\\.el$"))
 '<)
```

2f!9$N<h$j4:$($:$NL\I8$O!" 10 L$K~$NC18l$d%7%s%\%k$7$+4^$^$J$$4X?tDj5A$N?t$OIl$@$1$+!" 10 0J>e
L$K~$GOI$&$+!" 20 0J>e!" 30 L$K~$GOI$&$+!"$H$$$C$?$3HrD4Yk3HG"$k!#%=!<%H$5l??t$N%j
;H$&$H!"3l$O4JC1$G$"$k!#$^$:$O!" 10 L$K~$NMWAG$,Il$@$1$"$k$+$r?t$(!"$D$$$G!"$=$N<!$NMWAG$+$i
K~$NMWAG$,Il$@$1$+?t$(!"$^$?<!$N?t$+$i 30 L$K~$NMWAG$,Il$@$1$+?t$($k!"$H$$$&U&$KB3$1$F$$$/
20!" 30!" 40 Ey$N?t$O!"$=$NHO0O$N?t$N:GBghjbBg-$$?tKJ$k!#$3li$N?t$+iJ$k%j%9%H$O!" **top-
ranges**%j%9%H$H8F$YPh$$$@m&!#

7h$&$H;W$($P!"3Nh&$J%j%9%H$r<+F0E*$K@8@.$9k3Hb2DG=G"$k!#$,!":#2s$O<j$G=q$$$?J}$,Aa
$&!#<!$Nh&$J46$8G"$k!#

```
(defvar top-of-ranges
 '(10  20  30  40  50
   60  70  80  90 100
  110 120 130 140 150
  160 170 180 190 200
  210 220 230 240 250
  260 270 280 290 300)
 "List specifying ranges for `defuns-per-range'.")
```

HO0O$rJQ99$9kK$O!"$3$N%j%9%H$rJT=8$9$lPh$$!#

<!$K!"$3$N3F!9$NHO0O$KB0$9$kDj5A$N?t$N%j%9%H$r:n$k4X?t$r=q$/I,MW$,$"$k!#L@i+$K!"$3$N4X?t$O0z
$F **sorted-lengths** $H **top-of-ranges** %j%9%H$r<h$k3HKJ$k!#

defuns-per-range 4X?t$O!"Fs$D:n6H$r2?2s$b7+jJV9$3$HKJ$k!#0l$D$O8=:_$N top-of-range NCMK
hC$FFCDj$5lkHO0O$NDj5A$N?t$r?t$(k3$H!"$b$&0l$DO=$NHO0O$N?t$r?t$(=*oC$?$i<!KBg-$J **to
ranges**NCMK0\$k3HG"$k!#$3li$NF0:n$O7+jJV7JN$G!" **while** %k!<%W$r;H$&$3H,=PMh$k!#JR

%k!<%W$G8=:_$N top-of-range NCMG7h$^$kHO0O$NDj5A$N?t$r%+%&%s%H$7!"b&JRJ}$N%k!<%W$G$O=g$K top-of-range NCMrA*Br7F$$$/!#

3F!9$NHO0O$K$D$$$F!" **sorted-lengths** %j%9%HNCfN4vD+$N%(%s%H%j$,%+%&%s%H5l$k!#=>$C$F **sorted-lengths** %j%9%HKD$$$F$N%k!<%W$O **top-of-ranges** %j%9%H$N%k!<%W$NCfKCV+lk3HKJ$k!# Bg$-$J%.%d$NJ+$N>.$5$J%.%d$_$?$$$J46$8$@!#

FbIt$N%k!<%W$G$O!"3:Ev$9$kHO0O$NDj5A$N?t$,%+%&%s%H5l$k!#$3lO!":#$^$G$K2?2s$b8+$?$h$&$JC1=c %WG"$k!# (Section 11.1.3, "A}2C9k%+%&%s%?$r;H$C$?%k!<%W", p. 85, $r;2>H!#) %k!<%W$N??56%F%9%H$ **sorted-lengths** %j%9%HNCfN?t$,8=:_$N top-of-range NCMhjb>.$5$$$+I&$+$r8+k3HKJk!#b $=$&Ji!"%+%&%s%?$r01$DA}d7$F!"<!$N **sorted-lengths** $N%(%s%H%j$K0\F0$9$k!#

7k6I!"FbIt$N%k!<%W$O<!Nh$&$KJk!#

```
(while length-element-smaller-than-top-of-range
  (setq number-within-range (1+ number-within-range))
  (setq sorted-lengths (cdr sorted-lengths)))
```

30It$N%k!<%W$O **top-of-ranges** %j%9%H$N:G>.CM$+$i;O$^CF!"=gKBg-JCMK0\$C$F$$$/3HKJ$k!#$ $?$aKO!"<!Nh$&$K9lPh$$!#

```
(while top-of-ranges
  body-of-loop...
  (setq top-of-ranges (cdr top-of-ranges)))
```

3lir9go;kH!"FsDN%k!<%W$O<!$Nh&KJ$k!#

```
(while top-of-ranges

  ;; 8=:_$NHO0O$K$"$kMWAG$N?t$N%+%&%s%H
  (while length-element-smaller-than-top-of-range
    (setq number-within-range (1+ number-within-range))
    (setq sorted-lengths (cdr sorted-lengths)))

  ;; <!$NHO0O$K0\F0
  (setq top-of-ranges (cdr top-of-ranges)))
```

99$K!"0l2s$N30It%k!<%W4H$K!" Emacs K=$NHO0O$KB0$9$kDj5A$N?t$r5-O?5;kI,MW,$"$k!# (%j%9% $N **number-within-range** NCMG$"$k!#3NL\E*KO!" **cons** $,;H$($k!# (Section 7.2, "**cons**", p. 58, $r ;2>H!#)

cons 4X?tO[$\$&$^$/F0:n9kN@$,!"0l$DFqE@$,$"$k!#=PMh$k%j%9%HGO:G=iKBg-$$J}$NHO0O$KF~$ $N?t$,$-$F!":G8e$K>.$5$$J}$NHO0O$N?t$,$-F7$^$&N@!#3l$O!" **cons** $,?7$7$$MWAG$r%j%9%H$N@hF,$ $F$$$/3H$H!">e$NFsDN%k!<%W$O>.$5$$J}$+$iBg$-$$J}$XD9$5$N%j%9%H$r:n@.7F$$$/$?$a$K!" **defuns-per-range-list** $,:GBg$N?t$G=*$ok3H+iNEvA3$N5"7k$G$"$k!#7+$7!"%0%i%U$rI=<(9k:]KO>.$5$$CM $r@h$KI=<(7?$$!#3NLdBj$r2r7h$9kK$O!" **defuns-per-range-list** $N=g=x$r5UK7F7$^$(Ph$$!# lO!" **nreverse** $H$$$&%j%9%H$N=g=x$r5UK9$k4X?t$r;H$&$H$"$C5j2r7h9k!#

Nc$($P!"

```
(nreverse '(1 2 3 4))
```

H9kH!"

```
(4 3 2 1)
```

$,JV$k!#

Cm0U7FM_$7$$$N$O!" **nreverse** $O!VGK2uE*!W$G$"$k$H$$$&3HG"$k!#$3lO!":nMQ5;$?%j%9%H$rJ F7$^$&3H$r0UL#$7$F$$$k!# (LuCp!'3l$O5U$N=g$N%j%9%H$K@_Dj5lkH$$$&3HGOJ/$F!"J8;zDI 5lF7$^$&$H$$$&3HG"$k!#) :#$N>l9g!"85$N **defuns-per-range-list** OI,MWJ$$$N$G!"$3l,GK2u

lF$b2?$NLdBjbJ$$!# (0lJ}!" **reverse** 4X?t$O85$N%j%9%H$r5U$KJB$Y49$($??7$7$$%j%9%HrJV9!#3N>
85$N%j%9%H$OJQ2=7J$$!#)

0J>e$rA4$FAH9go;kH!" **defuns-per-range** $O<!$Nh&KJ$k!#

```
(defun defuns-per-range (sorted-lengths top-of-ranges)
  "SORTED-LENGTHS defuns in each TOP-OF-RANGES range."
  (let ((top-of-range (car top-of-ranges))
        (number-within-range 0)
        defuns-per-range-list)

    ;; 30It$N%k!<%W
    (while top-of-ranges

      ;; FbIt$N%k!<%W
      (while (and
              ;; ?tCM0z?t$H$7$F?t$,I,MW
              (car sorted-lengths)
              (< (car sorted-lengths) top-of-range))

        ;; 8=:_$NHO0O$KF~$k4X?t$N?t$r?t$($k
        (setq number-within-range (1+ number-within-range))
        (setq sorted-lengths (cdr sorted-lengths)))

      ;; FbIt$N%k!<%W$OH4$1$k$,!"30It$N%k!<%W$K$OF~$C$?$^$^

      (setq defuns-per-range-list
            (cons number-within-range defuns-per-range-list))
      (setq number-within-range 0)      ; %+%&%s%?$r 0 $K%j%;%C%H

      ;; <!$NHO0O$K0\F0
      (setq top-of-ranges (cdr top-of-ranges))
      ;; <!$NHO0O$N%H%C%W$rFCDj
      (setq top-of-range (car top-of-ranges)))

    ;; 30It$N%k!<%W$rH4$1$F:G$bBg$-$$$NHO0O$KB0$9$k4X?tDj5A$N?t
    ;; $r?t$($k
    (setq defuns-per-range-list
          (cons
           (length sorted-lengths)
           defuns-per-range-list))

    ;; >:=g$GJB$V4X?tDj5A$ND9$5$N%j%9%H$rJV$9!#
    (nreverse defuns-per-range-list)))
```

3N4X?tOAgCH7$??FCD' $r=|$$$F$O!"Hs>o$KC1=cG"$k!#FbIt$N%k!<%W$N??56%F%9%H$O<!NDLj!#

```
(and (car sorted-lengths)
     (< (car sorted-lengths) top-of-range))
```

G"CF

```
(< (car sorted-lengths) top-of-range)
```

GO$J$$!#3N%F%9%H$NL\E*$O **sorted-lengths** %j%9%H$N:G=i$NMWAG$,$=$N;~E@$G$N top-of-range NCM
jb>.$5$$$+I&$+$r7hDj9k3HG"$k!#

8e$K5s$2$?C1=c$JJ}$N%F%9%H$G$b **sorted-lengths** %j%9%H$, **nil** KJk^GO$&$^$/F0:n9k!#7+$7
nil KJkH!" **(car sorted-lengths)** <0$O **nil** rJV9!# **<** 4X?t$O?tCM$H **nil** !"B($A6u%j%9%H$H$rHf3S$G$-
$J$$$?$a!" Emacs O3$3$G%(%i!<$r=P$7!"4X?tO=3G<B9T$r;_$aF7$^$&!#

sorted-lengths %j%9%H$O%+%&%s%?$,%j%9%H$N:G8e$^$GC)$jD1$P>o$K **nil** KJ$k!#=>$C$F!"$3$N **defuns-per-range** 4X?t$N??56%F%9%H$NC1=c$J%P!<%8%g%s$NJ}$O>o$K<:GT9k3HKJ$k!#

3NLdBj$O!" **(car sorted-lengths)** <0$H **and** <0$rAH$_9g$o$;$k3H$G2r7h$9k3H,=PMh$k!# **(car sorted-lengths)** <0$O%j%9%H$,:GDc0lDG$bMWAG$r;}FP!" **non-nil** rJV9!#$=$7$F%j%9%H$,6uKJC? $@$1 **nil** rJV9!# **and** <0$O:G=i$K **(car sorted-lengths)** <0$rI>2A$7!"b7$=$l$, **nil** Ji **<** <0$rI>2A$9 $kA0$K56rJV9!#7+$7!"$b$7 **(car sorted-lengths)** <0$, **non-nil** JCMrJV$;$P!" **<** <0$bI>2A$7!"$=$NCM $r **and** <0A4BN$NCMrJV9!#

3&7F%(%i!<$,2sHr=PMh$k3HKJ$k!# **and** KD$$$F$N>\:Y$O!" Section 12.4, "**forward-paragraph**: 4X?t$N6bL.", p. 99, $r;2>H$N3H!#

<!$K **defuns-per-range** KD$$$F$N4JC1$J%F%9%H$r:\$;F*$/!#:G=i$K (C;=L7?) %j%9%H$r **top-of-ranges** $K%P%$%s%I9k#S<0$rI>2A$7!"<!$K **sorted-lengths** %j%9%H$r%P%$%s%I9k#S<0$rI>2A$7!":G8e **defuns-per-range** 4X?t$rI>2A$7F_h&!#

```
;; (8e$G;H$&$b$N$h$j$+$OC;$$%j%9%H)
(setq top-of-ranges
 '(110 120 130 140 150
   160 170 180 190 200))

(setq sorted-lengths
      '(85 86 110 116 122 129 154 176 179 200 265 300 300))

(defuns-per-range sorted-lengths top-of-ranges)
```

<!Nh$&$J%j%9%H$,JV$5lkO:G"$k!#

```
(2 2 2 0 0 1 0 2 0 0 4)
```

<B:]!" **sorted-lengths** %j%9%HKO!" 110 L$K~$NFsDNMWAG$,Fs$D!" 110 $+$i 119 $^$G$NMWAG$bFs$D!" 120 $+$i 129 $^$GbFsD!"$H$$$C$?46$8KJCF$$$k!#$^$?!" 200 0J>eNCMNMWAG$O;M$D$"$k!#

15 %0%i%UrIA/=`Hw

2f!9$NL\I8$O!" Emacs $N%=!<%9$NCf$NMM!9$JD9$5$N4X?tDj5A$N?t$r%0%i%UK7$FI=<($9k3HG$"$C$?!

<B:]KO!"%0%i%U$r@8@.$9kK$O `gnuplot` Nh$&$J%W%m%0%i%`$r;H$C$F$$$k$3$H$@$H;W$&!# (`gnuplot` GNU Emacs $HAj@-$,$h$$!#) $7$+$7$J$,$i!":#2s$O0l$+$i%W%m%0%i%`$r=q$$$F$$$/3HK9$k!#$=7F$= Dx$G!":#$^$G3XsG$-$?;vJA$r:FEY3NG'$7DD!"?7$7$$$3Hb3XsG$$$/3HK7h&!#

3N>OGO!"$^$:%0%i%U$rI=<($9$kC1=c$J4X?t$r=q$$$F$_$k!#:G=i$NDj5A$O?w7? (*prototype*) G"$j!" %U$r:n@.9k$H$$$&LCNNNN0h$rDe;!$9k?aK<h$j4:$($:=q$$$F$_$k$H$$$C$?N`$NbNG"$k!#2f!9$ON 9k$+$b7l$J$$$7!"0?$$$O$=$l$,C1$J$k?@OC$G$"$k3H$,J,$k$+$b7l$J$$!#Hb$+$/COM}463P$,DO$a$ $P!"<+?.$bD/$7!"4X?t$r3HD%7F<4$K<+F0E*$K%i%Y%krD1k3H$b=PMh$kh&KJk@m&!#

Emacs OIsJ<oN`$N%?!<%_%J$kGbF0:n9kh&=@Fp$K@_7W$5lF$$$k!#$=$NCfKO%-%c%i%/%?!<$@$ I=<(=PMh$J$$%?!<%_%J%k$b4^$^lF$$$kNG!"%0%i%U$O!V%?%$%W%i%$%?!W$NJ8;z$+$i=PMh$F$$$kI,MW$,$"$ 4:$($:$O%"%9%?%j%9%/$r;H$&$N$,$h$$$@m&!#8e$+$i4X?t$r3HD%$7$F!"$3$NJ8;z$r%f!<%6!<$,A*Br=PMh$k$ k3Hb2DG=$@!#

3N4X?t$r!" `graph-body-print` $H8F$V3HK7h&!#3l$O0z?t$H7F `numbers-list` $r<h$k!#8=CJ3, GO%0%i%U$N%i%Y%k$O=PNO$;$:!"K\BNItJ,$@$1$rI=<($9k3HK9k!#

`graph-body-print` 4X?t$O!" `numbers-list` $N3F!9$NCMKBP7$F!"%"%9%?%j%9%/$r?bD>KJBY$FI=<($9 $k!#$=l>lN9b5O!" `numbers-list` $N3FMWAG$NCMKhCF7h$^$k!#

%"%9%?%j%9%/$r?bD>$KJBYkF0:n$O7+$jJV7G$"$k!#=>CF!" `while` %k!<%W$+:F5"$r;HCF=q$/$3H $k!#

:G=i$N:$Fq$O!"G!2?$K7F%"%9%?%j%9%/$r=D$KJBY?bN$rI=<($9k+G"$k!#IaDL!" Emacs >e$G%?%$% $H!"J8;z$O%9%/%j!<%s>e$K?eJ?$K!"9T4H$KI=<($5lF$$$/!#2r7hXNF;$OFsDL$j$"$k!#0lDO<+J,$G?bD 9kh&$J4X?t$r=q$/3H!"b&0lDO85!9 Emacs K=Nh$&$J4X?t$,$J$$$+C5$9$3HG$"$k!#

Emacs $KFCDj$N5!G=$r;}$C$?$bN,$J$$$+C5$9>l9g$K$O!" `M-x apropos` %3%^%s%I$r;H$&$3H,=PMh$k!#$ %3%^%s%I$O!" `C-h a` (command-apropos) %3%^%s%IH[$\F1MM$JN@$,!" command-apropos $NJ}$O%3%^%s%I $@$1$7$+8!:w7J$$!# `M-x apropos` $NJ}$O!"%$%s%?%i%/%F%#%V$G$J$$$bNb4^aF@55,I=8=$K%^%C%A$9k A4$F%j%9%H$7F/lk!#2f!9$,C5$7$F$$$kbN$O=D$NJ8;zNs (column) $rI=<((print) 7?$jA^F~ (insert) $?$j9k%3%^%s%IG"$k!#2DG=@-$H7F$O!"$=Nh$&$J4X?t$O ‘print’ H+ ‘insert’ H+ ‘column’ $H$$$C$? ;zNs$r4^sG$$$=$&$G$"$k!#$=$3$G!"C1=c$K `M-x apropos RET print\|insert\|column RET` H7$F!"7k 2L$r8+F_$k!#;d$N%7%9%F%`$G$O!"$3$N%3%^%s%I$N<B9T$K$O;C$/;~4V$,$+$+$j!"7k6I 79 8D$N4X?t5Z$SJQ?t %H$,I=<($5$l$?!#$3$N%j%9%H$rC5$7$F$_$k$H!"2f!9$N;E;v$KLrN)$A$=$&$J$N$O!" `insert-rectangle` $@$1$ $k!#<B:]!"$3l,2f!9$N5a$a$F$$$?4X?tG"$k!#@bL@$rFIsG$_$h$&!#

```
insert-rectangle:
Insert text of RECTANGLE with upper left corner at point.
RECTANGLE's first line is inserted at point,
its second line is inserted at a point vertically under point, etc.
RECTANGLE should be a list of strings.
```

4JC1$J%F%9%H$r9TCF!"3l$,K\Ev$K5aakbN$+$r3N$+$aF_h&!#

0J2<$,!" `insert-rectangle` <0$ND>8e$K%+!<%=%k$r;}CF$$$C$F!" `C-u C-x C-e` (`eval-last-sexp`) $H %?%$%W7F$_$?7k2LG"$k!#$3$N4X?t$O!"‘"first"’, ‘"second"’ $=$7$F ‘"third"’ $r%]%$%s%H$N2<$KI=<($ $k!#4X?tA4BN$H7F$O!" `nil` $,JV$k!#

```
(insert-rectangle '("first" "second" "third"))first
                                              second
                                              thirdnil
```

(LuCp!'9-$/G[I[$5$1$F$$$k Mule 2.3 (Emacs version 19.28) GO!"3N4X?t$K%P%0$,$"$k!#$3$1$O!"
'lisp/rect.el' $N:G8e$NJ}K"$k **move-to-column-strictly** $N4X?tDj5A$NCf$G!";M9TL\$N **clm** $r
(progn (if force (indent-to column)) column) $GCV49$(k3HG=$@5=PMh$k!#)

L^O@!"2f!9$O **insert-rectangle** <0$=$NbN$r%0%i%U$rIA$/%P%C%U%!$KA^F~7?$$$NGO$J$$!#$=$&G
$/!"2f!9$N%W%m%0%i%`$+$i3N4X?t$r8F$S=P7?$$$NG"$k!#$?$@$=$N:]!"%]%$%s%H$,%P%C%U%!$NCf$G!"$
insert-rectangle 4X?t$G=D$NJ8;zNs$rA^F~$9Y-0LCVK"k+I&$+$r3N$+$aJ1lPJi$J$$!#

b7$3$NJ8>O$r Info NCfGFIsG$$$kJi!"$^$: '***scratch***' JI$NJL%P%C%U%!$K0\$j!"%]%$%s%H$r%
%U%!NI3+KCV-DD **M-ESC**$H%?%$%W7F!"B3$1$F%_%K%P%C%U%!$G **insert-rectangle** <0$r%?%$%W7
dk3H$G!"$3Nh$&$JF0:n$,2DG=$G$"$k3H$,J,$k!#$3$3GO!"#S<0$rI>2A$9kN$O%_%K%P%C%U%!$NCf
N@$,!"$=$N:]$N%]%$%s%H$NCMH7FO!"'***scratch***' %P%C%U%!NCfN%]%$%s%H$NCM$,;H$o1?NG$"$C
(**M-ESC** $O **eval-expression** $N%-!<%P%$%s%G%#%s%0G"$k!#)

<B:]KdCF$_$k$H!"%]%$%s%H$,D>A0$KF~NO7?9T$N:G8e$K$"$k>uBV$G=*$ok3$H — D^$j!"3N4X?t
MQH7$F!"%]%$%s%H$r0\F0$9k3H,J,$k!#$3$N%3%^%s%I$rB3$1$F<B9T9k$H!"<!$NA^F~$OA02s$N0LCV$+$
$S1&J}8~$K0\F0$7$?=j$+$i9To1$k!#$3$1$G$O:$$k!#K@%0%i%U$r:n@.$9kK$O!"=D$NNs$,NYF1;N$KJBPJ$
iJ$$!#

$H$$$&o1$G!"K@%0%i%U$rA^F~9k **while** %k!<%W$N3F!9$N%5%$%/%k$G!"%]%$%s%H$N0LCV$rE,@Z$J0LCV$K:
9kI,MW$,$"k3H,J,C?!#$^$?!"$=$N0LCV$O=D$NNs$N0lHV>e$G$"$CFDlGOJ$$!#99$K!"$3$N%0%i%U$
$k:]$K!"8D!9$N=D$NNs$ND9$5$,A4$FB7$&$3HO$^$:$J$$!#D^$j!"3F!9$N=DK@NFCZsN9b5O!"A0N
kN$,IaDL$G$"$k!#=>CF!"C1$KA0$HF1$89T$K%]%$%s%H$r0\F0$7$F$$$/$@$1GOBLL\$G$"$k!#$=$&GOJ/

2f!9$O%0%i%U$r%"%9%?%j%9%/$GI=<($7h&H7$F$$$?NG$"$C$?!#%"%9%?%j%9%/$N?t$O **numbers-list** $N
$NMWAG$G;XDj5l$k!#$3$N%"%9%?%j%9%/$rMWAGH9$k%j%9%H$r!" **insert-rectangle** $r8F$S=P9?SK:n@
kI,MW,$"$k!#b7!"3N%j%9%H$,C1$KI,MW$J?t$N%"%9%?%j%9%/$@$1$+$iJC$F$$$?H9kH!"%]%$%s%H$
%0%i%U$N4p=`@~$+$i@5$7$$9T?t$@$1>e$N0LCV$K$*$+J1lPJi$J$$!#7+$7!"$3lOFq$7$$!#

$=$NBeoj!"b7 **insert-rectangle** KBP7$F>o$K0lDj$ND9$5$N%j%9%H$rEO$9$3H,=PMhlP!"%]%$%s%
>o$KF1$89T$N0l$D1&$N7e$K0\F0$9$lPh$/$J$k!#$7$+$7!"3N>l9gKO **insert-rectangle** KEO5lk%j%
$N$$$/D+$NMWAG$O%"%9%?%j%9%/GOJ/6uGrKJ$k!#Nc$($P!"$b$7%0%i%U$N:GBg$N9b$5$, 5 G"$j!"8=:_
$, 3 G"C?H9kH!" **insert-rectangle** $O!"<!$Nh&$J0z?t$rI,MWH9$k!#

```
(" " " " "*" "*" "*")
```

3N:G8e$NJ}K!$O!"=DNNsN9b5r7hDj=PMh5(9l$P!"$=l[IFq7$/$O$J$$!#=DNNsN9b5rFCDj$
FsDNJ}K!$,$"$k!#0l$D$O2f!9$,e:No$KI=<($5lkh&$J9b$5$r>!<j$K;XDj7F7^$&$H$$$&bN!"b&0
?t$N%j%9%H$r8!:w7F!":GBgNbNr%0%i%U$N:GBg$N9b5H7F;H$&$H$$$&bNG"$k!#8e<T$NJ}K!$,Fq$
$O!"A0<T$r:NMQ9kN,3ZG"$k!#$,!" Emacs KO!"=ia+$i0z?t$NCf$G:GBg$NbN$r7hDj$9$k4X?t$,AH$
$F$$$k!#3N4X?t$r;H$*$&!#4X?t$NL>A0$O **max** $G!"A4$F$N0z?t$NCf$G:GBg$NbNrJV9!#0z?t$O?t$G$J$1
iJ$$!#=>CF!"Nc$($P!"

```
(max  3 4 6 5 7 3)
```

$O 7 rJV9!# (3lKBP7$F **min** $H$$$&4X?t$O!"0z?t$NCf$G:G>.$NbNrJV9!#)

7+7J$,$i!"C1$K **numbers-list** $N>e$G **max** $r8F$S=P$9$3HO=PMh$J$$!# **max** $O?t$N%j%9%HGOJ/
?t$r0z?t$H7FMW5a9k$+$i$@!#=>$C$F!"

```
(max  '(3 4 6 5 7 3))
```

HdkH!"<!Nh$&$J%(%i!<%a%C%;!<%8$,JV$5lk!#

```
Wrong type of argument:  number-or-marker-p, (3 4 6 5 7 3)
```

=>CF!"%j%9%H$NCf?H$r0z?tH7$F4X?t$KEO9h$&$J4X?t$,I,MW$KJk!# **apply** $H8F$Plk4X?t$,$3$NL
2L7F$/$l$k!#$3$N4X?t$O$=$N:G=i$N0z?t$G$"$k4X?t$K!";D$j$N0z?t$rE,MQ (apply) 9k!#3N;~!":G8e$
$O%j%9%H$GJ1lPJi$J$$!#

Nc$($P

```
(apply 'max 3 4 7 3 '(4 8 5))
```

$O 8 rJV9!#

($D$$$G$K$$$&$H!";d$O3N4X?tr3$NJ8=q$Nh&JbNr;Ho:$K8+$D1@$9J}K!$rCNiJ$$!#B>$N sea
forward $d insert-rectangle $H$$$C$?4X?t$JiP!"L>A0$N0lItJ,$r?dB,7F apropos $r;H$(Ph$$!#$1
lI$b apply KD$$$F$O!"L>A0$N85HJ$k%a%?%U%! — :G=i$N0z?t$K;D$j$r 'apply' 9k — $OL@$i$+$G$"$
7F$b!"=i?4<T$, apropos $dB>$N=u1r<ZjF3Nh&$JFCDj$JC18l$KC)$jCe1kHO;WoJ$$!#L^O@!";
0cCF$$$kN+b7lJ$$!#7k6I$O!"4X?t$O$=$1$r:n$C$??M$KhC$FL>IU$1ilkbNJNG$"$k!#)

apply $NFsHVL\0J9_$N0z?t$O>JN,2DG=$G$"$k!#=>CF!" apply $r;H$C$F!"4X?t$K%j%9%H$NMWAG$r0z?t$H$7
7F8F$S=P$9$3$H$b=PMh$k!#Nc$($P!"<!$O 8 rJV9!#

```
(apply 'max '(4 8 5))
```

3N:G8eNNc,2f!9$NL\E*$K$"$C$F$$$k!# recursive-lengths-list-many-files 4X?t$O!"?t$N%j%9%H
rJV9$,!"$3lr max KE,MQ9k3H,=PMhko1G$"$k!# (max $K%=!<%H$5l?%j%9%HrEO9$3$H$b=PMh$
3N>l9g$O%=!<%H$5lF$$$Fb5lF$$$J$/$F$b4X78$J$$!#)

$H$$$&o1$G!"%0%i%U$N:GBg$N9b$5$r5a$a$kA`:n$O<!NDLjG"$k!#

```
(setq max-graph-height (apply 'max numbers-list))
```

GO!"%0%i%U$N=D$NNsrIA/$?$a$NJ8;zNs$N%j%9%HrI$&$dCF:nlP$h$$$+$H$$$&LdBjKLam$&!#$3$N
%0%i%U$N:GBg$N9b5H8D!9$N=D$NNsNCfN%"%9%?%j%9%/$N?t$+$i!" insert-rectangle %3%^%s%I$,A^F~$9$
;zNs$N%j%9%H$rJV$9I,MW$,$"$k!#

3F!9$N=D$NNs$O6uGr$H%"%9%?%j%9%/$+$iJk!#9b5H%"%9%?%j%9%/$N?t$,J,lP!"6uGr$N?t$O$=$N:9H
il$k!#$=7F6uGr$H%"%9%?%j%9%/$N?t$,J,$l$P!"Fs$D$N while %k!<%W$r;HCF%j%9%H$r:n$k3H$,=PMh$

```
;;; :G=i$N%P!<%8%g%s
(defun column-of-graph (max-graph-height actual-height)
  "Return list of strings that is one column of a graph."
  (let ((insert-list nil)
        (number-of-top-blanks
         (- max-graph-height actual-height)))

    ;; %"%9%?%j%9%/$r5M$a$k
    (while (> actual-height 0)
      (setq insert-list (cons "*" insert-list))
      (setq actual-height (1- actual-height)))

    ;; 6uGr$r5M$a$k
    (while (> number-of-top-blanks 0)
      (setq insert-list (cons " " insert-list))
      (setq number-of-top-blanks
            (1- number-of-top-blanks)))

    ;; %j%9%HA4BN$rJV$9
    insert-list))
```

3N4X?t$r%$%s%9%H!<%k7F$+$i<!$N#S<0$rI>2A9k$H!"5a$a$k%j%9%H$,F@ilkO$:$@!#

```
(column-of-graph 5 3)
```

$rI>2A$9kH!"

```
(" " " " "*" "*" "*")
```

$,JV$5lk$H$$$&o1G"$k!#

A0Kb=q$$$?$,!" **column-of-graph** KOBg$-$J7g4Y$,$"$k!#6uGr$H0uN?aKMQ$$$ilk5-9f$O%9%Z!<%
%"%9%?%j%9%/$K!V%O!<%I%3!<%I!W$5lF$$$k!#3l$O?w7?$H7FOh$$!#$,!"$"J?$dB>$N%f!<%6$OB>$N5
$$$?$$$H;W$&$3HbB?$$$@m&!#Nc$($P!"%0%i%U4X?t$r%F%9%H$7F_$k:]$K$O!" **insert-rectangle** 4X?t$
Pl$?;~$K%]%$%s%H$N0LCV$,$-As$H0\F0$5lF$$$k$+$I$&$+$r8+$k$?$a$K!"%9%Z!<%9$NBeoj$K=*;_Id$
$$$H;W$&$@m&!#$^$?!"%"%9%?%j%9%/NBeojK '+' Ey$N5-9f$r;HC?j7$?$$$H;W$&$3Hb$"$k$K0c$$
99$K!"%0%i%U$N7e?t$r%G%#%9%W%l%$$N0l7e$NI}$hjb9-$/<h$j$?$$$H;W$&$3Hb$"$k$@$m$&!#$=$&$$$&o
%0%i%`ObCH=@FpG"kY$-$G$"$k!#$=$N$?$a$NJ}K!$H7F$O!"%9%Z!<%9$H%"%9%?%j%9%/$r **graph-blan**
graph-symbol $H$$$&FsDNJQ?tGCV-49$($F!"3liNJQ?trJLKDj5A9k3H$,9M$(il$k!#

$^$?!"@bL@J8;zNs$b2r$jd9$$$H$O8@$($J$$!#0J>eN3Hr9MN8$9$k$H!"<!$Nh&$J4X?t$KC)jCe/!#

```
(defvar graph-symbol "*"
  "String used as symbol in graph, usually an asterisk.")

(defvar graph-blank " "
  "String used as blank in graph, usually a blank space.
graph-blank must be the same number of columns wide
as graph-symbol.")
```

(**defvar** $N@bL@$K$D$$$F$O!" Section 8.4, "**defvar** $rMQ$$$?JQ?t$N=i4|2=", p. 70, $r;2>H!#)

```
;;; FsHVL\$N%P!<%8%g%s
(defun column-of-graph (max-graph-height actual-height)
  "Return list of MAX-GRAPH-HEIGHT strings;
ACTUAL-HEIGHT are graph-symbols.
The graph-symbols are contiguous entries at the end
of the list.
The list will be inserted as one column of a graph.
The strings are either graph-blank or graph-symbol."

  (let ((insert-list nil)
        (number-of-top-blanks
         (- max-graph-height actual-height)))

    ;; graph-symbols $r5M$a$k
    (while (> actual-height 0)
      (setq insert-list (cons graph-symbol insert-list))
      (setq actual-height (1- actual-height)))

    ;; graph-blanks $r5M$a$k
    (while (> number-of-top-blanks 0)
      (setq insert-list (cons graph-blank insert-list))
      (setq number-of-top-blanks
            (1- number-of-top-blanks)))

    ;; %j%9%HA4BN$rJV$9
    insert-list))
```

b7K>$`$J$i!" **column-of-graph** $b=q49$($F!"%*%W%7%g%s$H7FK@%0%i%U$@$1GJ$/!"@~%0%i%U$b=q1
$&$K$b=PMh$k!#3lO=sJKFq7$$$3HGOJ$$!#@~%0%i%UrI$&IA$/$+$@$,!"Nc$($PK@%0%i%U$K$*$$$
>e$NE@$+$i2<$OA4$F6uGr$K7F7^$($P!"$=$lOb$&K@%0%i%U$H$O8F$Y$J$$$@m&!#@~%0%i%UN?aN=D$
$r:n$kKO!"$^$:OCMhjb0lD@$1>/$J$$?t$N6uGr$N%j%9%H$r:n$j!"$D$$$G **cons** $rMQ$$$F%j%9%H$K%0%i
$rDI2C$7!":G8e$K!">e$NM>GrItJ,$N?t$N6uGrrIU1B-$;$P$h$$!#

3&$$$&4X?t$r<B:]$K=q$/$N$b4JC1$@$,!":#$N=jOI,MWJ$$$N$G!"=q$+$J$$$G$*$/3HK9$k!#$,!"H
$/$3HO=PMhk7!"$^$?3N4X?t$r0lEY=q$$$F7^$($P!" **column-of-graph** $G;H$&3H$b=PMh$k!#$3$3$G

J3HO!"B>$NItJ,$N=q-49(OKXI7J$/$F$bNI$$$H$$$&3HG"$k!#B($A!"3HD%7h$&$H;W$($P4JC1$
o1$@!#

5F!"dC$H!"<B:]$N:G=i$N%0%i%U$r=q$$$F$_$k=j$^$GMh$?!#$3$3$G$O%0%i%U$NK\BN$@$1$rI=<($7!"=D<
$N%i%Y%k$OI=<(7J$$!#$=$3$G!"$3$N4X?t$r **graph-body-print** $H8F$V3HK9$k!#

15.1 4X?t graph-body-print

A0@a$^$G$N=‘Hw$N8eGO!" **graph-body-print** 4X?tO"CH$$$&$^$K=PMhF7$^$&!#3N4X?t$O!"?tCM$
%9%H$+$i3F!9$N=D$NNsNCfN%"%9%?%j%9%/$N?t$r7hDj$7!"0l7e$*$-$K%"%9%?%j%9%/$rMQ$$$?%0%i%U$rI=<
3l$O7+$jJV7NF0:nJN$G!"8=>] **while** %k!<%W$+!":F5"$r;H$C$F=q$/3H$,=PMh$k!#3N%;%/%7%g%s$
while %k!<%W$rMQ$$$FDj5A$r=q$$$F$_$h$&!#

column-of-graph 4X?t$O!"0z?t$H7F%0%i%U$N9b$5rI,MWH9k!#3NCMrDja$?$J$i!"6I=jJQ?t$H7
O?7F$*$/Y-G"$k!#

3liN3H$+$i!"3N%P!<%8%g%sK*$$$F$O<!$Nh&$J **while** %k!<%W$N%F%s%W%l!<%H$,=PMh$k!#

```
(defun graph-body-print (numbers-list)
  "documentation..."
  (let ((height  ...
         ...))

    (while numbers-list
      insert-columns-and-reposition-point
      (setq numbers-list (cdr numbers-list)))))
```

3NCf$N6u$-%9%m%C%HrKda$F$$$/3HKJ$k!#

EvA3!"%0%i%U$N9b$5$N7hDj$K$O **(apply 'max numbers-list)** <0$r;H$&3H$,=PMh$k!#

while %k!<%W$O **numbers-list** $N3FMWAG$KBP7F0l2s$:$D2s$k!#$3$N%j%9%H$O **(setq numbers-list (cdr numbers-list))** <0KhCFC;$/$JCF$$$-!"3F;~E@GN%j%9%H$N CAR $, **column-of-graph** $K0z
?tH7FEO5lk!#

3N **while** %k!<%W$N3F%5%$%/%k$G!" **column-of-graph** KhCFJV5l$?%j%9%H$, **insert-rectangle**
4X?tKEO5lk!# **insert-rectangle** 4X?t$O%]%$%s%H$rA^F~$5l?6k7A$N1&2<$N%]%$%s%H$K0\F0$9$kN
$=$l$r6k7A$,A^F~5l$kA0$N0LCVKLa7F+$i!"<!$N0LCV$K?eJ?J}8~$K0\F0$7$FdkI,MW$,$"$k!#$=$3
insert-rectangle $,8F$Plko1G"$k!#

C1FH$N6uGr$H%"%9%?%j%9%/$r;H$C$?>l9g$JINh&$K!"$b$7A^F~$5lk$K@%0%i%U$,0l7e$NI}$JiP!"
$?$a$N%3%^%s%I$OC1$K **(forward-char 1)** HJ$k!#$7$+$7!"3NI}ObCHBg$-$/Jk$+$b7l$J$$!#=
$F!" **(forward-char symbol-width)** $H=q$/J}$,NI$$!# **symbol-width**$O **graph-blank** $ND9$5G"$j!"
(length graph-blank) $H$$$&<0$G5a$ak3H,=PMh$k!# **symbol-width** $H$$$&JQ?t$r%0%i%U$NI}$K%P$$%s
%I9k0lHVNI$$0LCV$O **let** <0$NJQ?t%j%9%HNCfG$"$k!#

0J>eN3HrAm9g9k$H<!$Nh&$J4X?tDj5A$KJk!#

```
(defun graph-body-print (numbers-list)
  "Print a bar graph of the NUMBERS-LIST.
The numbers-list consists of the Y-axis values."

  (let ((height (apply 'max numbers-list))
        (symbol-width (length graph-blank))
        from-position)
```

```
      (while numbers-list
        (setq from-position (point))
        (insert-rectangle
         (column-of-graph height (car numbers-list)))
        (goto-char from-position)
        (forward-char symbol-width)
        ;; 3F7e$4$H$N%0%i%U$NIA<L
        (sit-for 0)
        (setq numbers-list (cdr numbers-list)))
      ;; X <4$N%i%Y%k$N$?$a$K%]%$%s%H$r0\F0
      (forward-line height)
      (insert "\n")
  ))
```

3N4X?tGO!"RH$DM=4|$7$F$$$J$+$C$?#S<0$,=PF/$k!#$=lO while %k!<%WNCfN (sit-for 0) <0$ $k!#$3$N<0$r;H$&$3HG!"%0%i%U$rI=<($9$k2aDx$r8+kN$,3Z$7$/$J$k!#$3$N<0$O Emacs $K 0 ;~4VBT$C$ 2hLL$r:FIA2h$5$;$kbNG"$k!#$3lr>e$N0LCV$KCV$/$HK@%0%i%U$,0l$D$:$DIA$+$l$F$$$/3HKJ$k!#5 J1lP!"4X?t$,;E;v$rA4$F=*N;$9k^$G%0%i%UOIA+lJ$$!#

<!Nh$&$K9l$P!"$3$N graph-body-print $rC;$$%j%9%HKBP7$F%F%9%H$7F_k3H,=PMh$k!#

1. $^$: graph-symbol!" graph-blank!" column-of-graph $=$7$F graph-body-print $r%$%s%9%H!< %k9k!#
2. <!$N#S<0$r%3%T!<9k!#

   ```
   (graph-body-print '(1 2 3 4 6 4 3 5 7 6 5 2 3))
   ```

3. '*scratch*' %P%C%U%!$K0\$j!"%0%i%U$rI=<($5$;$?$$0LCV$K%+!<%=%k$rCV$/!#
4. M-ESC (eval-expression) $H%?%$%W9k!#
5. C-y (yank) $r;H$C$F graph-body-print <0$r%_%K%P%C%U%!$K yank 9k!#
6. RET $r2!$7$F!" graph-body-print <0$rI>2A9k!#

Emacs $O<!$Nh&$J%0%i%U$rI=<(9kO:G"$k!#

```
          *
      *   **
      *  ****
     *** ****
    ********* *
   ************
  *************
```

15.2 4X?t recursive-graph-body-print

graph-body-print 4X?t$O!":F5"$r;HCF=q$/$3Hb=PMh$k!#$3$N>l9g$O!"FsDNItJ,$KJ,$1$F=q$/3 Jk!#30B&$N4X?t (wrapper) $G let <0$r;HCF!"%0%i%U$N:GBg$N9b5Nh&$K0lEY$@$17h$alP$h$$$h$& D+$NJQ?tNCMr@_Dj$7!"FbB&$N4X?t$G!":F5"8F$S=P7r;HCF%0%i%U$rI=<(9ko1G"$k!#

30B&$N4X?t (wrapper) OFCKJ#;(GO$J$$!#

```
(defun recursive-graph-body-print (numbers-list)
  "Print a bar graph of the NUMBERS-LIST.
The numbers-list consists of the Y-axis values."
  (let ((height (apply 'max numbers-list))
        (symbol-width (length graph-blank))
        from-position)
    (recursive-graph-body-print-internal
     numbers-list
     height
     symbol-width)))
```

:F5"4X?t$NJ}$O!"AgCHP+jFq7$$!#$3$1$O ‘do-again-test’!"%0%i%UI=<(%3!<%I!":F5"8F$S=P$7!"$= ‘next-step-expression’ $N;M$D$NItJ,$+iJ$k!# ‘do-again-test’ $O **number-list** K^$@MWAG$,;DCF$$$k $+$rH=Dj9k **if** <0G"$k!#$b$7;D$C$F$$$l$P!"0lK\$NK@%0%i%U$r=q$$$F$+$i$^$?<+J,<+?H$r8F$S=P$9!#4X J,<+?H$rb&0lEY8F$S=P$9$+$I$&$+$O!"7k6I$O ‘text-step-expression’ $,@8@.$9kCMKhk!#$3$1$O!"C;=LH **number-list** $K:nMQ$9kh$&$J8F$S=P$7$r9T$&!#

```
(defun recursive-graph-body-print-internal
  (numbers-list height symbol-width)
  "Print a bar graph.
Used within recursive-graph-body-print function."
  (if numbers-list
      (progn
        (setq from-position (point))
        (insert-rectangle
         (column-of-graph height (car numbers-list)))
        (goto-char from-position)
        (forward-char symbol-width)
        (sit-for 0)     ; 3F7e$4$H$N%0%i%U$NIA<L
        (recursive-graph-body-print-internal
         (cdr numbers-list) height symbol-width))))
```

$3$1$r%$%s%9%H!<%k7F<B:]$K%F%9%H$7F_k3H,=PMh$k!#<!$K%5%s%W%k$r5s$2$k!#

```
(recursive-graph-body-print '(3 2 5 6 7 5 3 4 6 4 3 2 1))
```

$3$1$r<B:]$KI>2A7F$_$k$H!"<!$Nh&$J%0%i%U$,IA$+$l$k!#

```
    *
   **   *
  ****  *
  **** ***
* *********
************
*************
```

graph-body-print $b **recursive-graph-body-print** $b%0%i%U$NK\BNItJ,N_rIA/4X?tG"$k!#

15.3 <4$rI=<($9$k

%0%i%UKO!"$=$1$,2?$rI=o9$+$r<(9?aK<4$rI=<($9kI,MW,$"$k!#0lEY$@$1$7$+%0%i%UrIA+J $P!" Emacs $N Picture mode $rMxMQ$7$F<j$G<4rIA/Nb7k9=G"$k!#$7$+$7!"3N4X?t$O2?EY$bMxMQ9 b7lJ$$!#

$H$$$&o1$G!"4pK\E*$J **print-graph-body** 4X?t$r3HD%$7$F!"<+F0E*$K2#<4$H=D<4$N%i%Y%k$rI=<($9k K7F_$?!#$3$N4X?t$KOFCK?7$7$$;vJA$O4^$^lF$$$J$$$N$G!"$3lK$D$$$F$N@bL@$O<!$N=j$G9k$3 $k!# Appendix C, “%i%Y%k$H<4$,IU$$$?%0%i%U”, p. 173.

15.4 N}=,LdBj

>e$HF1MM$J%0%i%U$rI=<($9$k4X?t$G!"2#K@$N%0%i%U$rIA$/%P!<%8%g%s$r:njJ$5$$!#

16 ‘.emacs’ %U%!%$%k

!vEmacs $r9%$-KJk?aK Emacs $r9%$-KJkI,MWO$J$$!#!W — 3N!"0l8+%Q%i%I%/%9Nh$&$KJ9$3$
3J8@3=$,!" GNU Emacs $NHkL)$G$"$k!#$?$@H"$r3+$1$F<h$j=P7?$^$^$N Emacs $O0lHLE*$JF;6qG7$
$$!#BgDq$N?M$O!"$=$l$r<+J,<+?H$,;H$$$d$9$$$h$&$K%+%9%?%^%$%:$9$k!#

GNU Emacs $OB?$/$NItJ,$, Emacs Lisp $G=q$+lF$$$k!#3l$O!" Emacs Lisp $N<0$r=q$/$3HG!"JQ99
7?$j3HD%$7$?$j=PMhkH$$$&3H$r0UL#$9$k!#

Emacs $N%G%U%)%k%H$N@_Dj$rAGD>$K$"$j$,$?$/;H$&?MC#$b$$$k!#$=$lGb Emacs $O C $N%U%!%$%k$rJT=8
:]$O C mode KJk7!" Fortran $N%U%!%$%k$rJT=8$9$k:]$O Fortran mode KJk7!"FC$K@_Dj$5lF$$$J$
%U%!%$%k$K$D$$$F$O Fundamental mode KJ$k!#C/$, Emacs $r;H$&$+J,$i$J$$>u67GO!"3l$O9gM}E*$J
DjG"$k!#?M!9$,IN%U%!%$%k$KBP7F2?r7$?$$$+$rGD0.=PMh$k?MJI2?=hKb$$$J$$$@m&!# Fundam
mode $OGD0.=PMh$J$$$h$&$J%U%!%$%k$KBP7F$N@5$7$$%G%U%)%k%HG"$k!#$Ag&$I C mode $, C $N%3!<
JT=8$9$k:]$N@5$7$$%G%U%)%k%HG"kN$HF1$8G"$k!#$7$+$7!"b7C/$, Emacs $r;H$*$&$H7F$$$k$+$,
9g — Nc$($P<+J,<+?H$,;H$&>l9g — Ji Emacs $r%+%9%?%^%$%:9kN,9gM}E*G"$k!#

Nc$($P;d$O!"E,Ev$J%b!<%I$,8+$D$+$i$J$$$h$&$J%U%!%$%k$KBP7F$O Fundamental mode K7$?$$$3H
IJ$$!#$=$&$$$&>l9gKO Text mode $r;H$&3H$,B?$$!#$=$3$G Emacs $r%+%9%?%^%$%:9k!#7k2LH7$
;dKHCF;H$$$d$9$$$bNKJk!#

Emacs $r%+%9%?%^%$%:7?$j3HD%$7$?$j9kKO ‘~/.emacs’ %U%!%$%k$r=q$/$3HKJk!#3l$O8D?MMQ$
4|2=%U%!%$%k$G$"$k!#Cf?H$O Emacs Lisp $G=q$+$l!" Emacs $K2?$r9k$+$rEA$($k!#

3N>OGO!"4JC1$J ‘.emacs’ $N@bL@$r9k!#hjB?$/$N>pJsKD$$$F$O!"0J2<$r;2>H7FM_$7$$!# Sec
“The Init File” in *The GNU Emacs Manual*, Section “The Init File” in *The GNU Emacs Lisp Reference Manual*.

16.1 %5%$%H$4HN=i4|2=%U%!%$%k

Emacs $O8D?ME*$J=i4|2=%U%!%$%k$K2C$($F!"%5%$%HMQ$N=i4|2=%U%!%$%k$,B8:_9l$P!"$=lb<+F0E*$K%
9k!#3liO ‘.emacs’ $HF1MM$J7A<0$G=q$+lk$,!"A40w$KBP7F%m!<%I5l$k!#

3N%5%$%HMQ$N=i4|2=%U%!%$%k$NCf$N ‘site-load.el’ $H ‘site-init.el’ NFsD$O!" Emacs $, dump
5l$k:]$K!"%m!<%I5l!"$+$DI8=‘E*JbNH7F ‘dump’ 5l$k!# (Dump 9k3H$G!" Emacs Oh$j
$/%m!<%I=PMh$k!#7+7J$,$i!"0lC6%U%!%$%k$,%m!<%I5l dump 5lkH!"b&0lEY<+J,$G%m!<%I$7$
dump 7?j7$J$$8B$j!"JQ99$O Emacs $KH?1G$5lJ$$!#3lKD$$$F$O Section “Building Emacs” in
The GNU Emacs Lisp Reference Manual, 5Z$S ‘INSTALL’ %U%!%$%k$r;2>H$N3H!#)

3l$i0J30$K$b;0$D$N%5%$%HMQ$N=i4|2=%U%!%$%k$,$"$j!"$=li$OB8:_$9lP Emacs $N5/F0;~$K<+F0E*$
%I5l$k!#$3$N;0$D$N%U%!%$%k$H$$$&NO!" ‘.emacs’ $NA0$K%m!<%I5l$k ‘site-start.el’!"5Z$S ‘.emacs
$N8e$K%m!<%I5l$k ‘default.el’ $HC<Kv%?%$%W%U%!%$%k$G$"$k!#

‘.emacs’ GN@_Dj$dDj5A$O!" ‘site-start.el’ GN@_Dj$dDj5A$r>e=q$-$9$k!#$=7F!" ‘default.el’ $d
C<Kv%?%$%W%U%!%$%k$,99$K$=$N@_Dj$dDj5A$r>e=q$-$9k3HKJk!# (C<Kv%?%$%W%U%!%$%kKh$k>e=q$-$r
$O!" **term-file-prefix** $r **nil** K9$k!# Section 16.10, “$AgCH7$?3HD%”, p. 148, $r;2>H!#)

G[I[NCfK4^$^$l$k ‘INSTALL’ %U%!%$%kKO!" ‘site-init.el’ $H ‘site-load.el’ KD$$$F$N@bL@$,$"
$k!#

‘loadup.el’!" ‘startup.el’!"$=$7$F ‘loaddefs.el’ %U%!%$%k$,%m!<%I$r%3%s%H%m!<%k7F$$$k!#3l$i
$N%U%!%$%k$O Emacs $NG[I[$NCf$N ‘lisp’ %G%#%l%/%H%j$NCfK"kN$G!"FI$sG_kHNI$$!#

‘loaddefs.el’ %U%!%$%k$K$O!"2?$r8D?ME*$J ‘.emacs’ %U%!%$%kNCfK=q$-!"2?$r%5%$%HMQ$N=i4|2=%U%!%$
$K=q$/Y-JN$+$H$$$&3HKD$$$FB?$/$NM-1W$J<(:6$,=q$+$l$F$$$k!#

16.2 $"$k%;%C%7%g%sGNJQ?t$N@_Dj

;d$N;HMQ$7$F$$$k Emacs version 19.23 KO!" **edit-options** %3%^%s%I$rMxMQ$7$F@_Dj=PMh$k 392 $N%*%W %7%g%s$,$"$k!#3liN!V%*%W%7%g%s!W$H$$$&NO0JA0@bL@7?h&$K!" **defvar** $r;H$C$FDj5A$5l?JQ? $.$J$$!#

Emacs GO!"3liNJQ?t$,!VMF0W$K@_Dj=PMhkh$&$K0U?^5l$?$bN+!W$H$$$&3H$r!"@bL@J8;zNs$ $N0lJ8;z$GH=JL7F$$$k!#D^$j!"$b$7:G=i$NJ8;z$, ‘*’ $@$C$?$i!"$=$NJQ?t$O%f!<%6$,@_Dj=PMh$k%*%W%7 $"$k!# (Section 8.4, “**defvar** $rMQ$$$?JQ?t$N=i4|2=”, p. 70, $r;2>H!#)

edit-options %3%^%s%I$O Emacs Lisp $N%i%$%V%i%j$r=q$$$??M!9$,4JC1$K@_Dj=PMhkh$&$K9kY$-$@$ 9M$($? Emacs $NJQ?t$rA4$FNs5s$7F/lk!#$=$7$F!"JQ?t$r4JC1$K:F@_Dj=PMh$kh&$J%$%s%?!<%U%'!<%9$ F/lk!#

0lJ}$G!" **edit-options** $G@_Dj$5l?%*%W%7%g%s$O8=:_$NJT=8%;%C%7%g%s$N4V$K7+8zNO$r;}$?$J$$!#?7 @_Dj7?CM$O<!$N%;%C%7%g%sKOJ]B8$5$l$J$$!# Emacs $O5/F0$5lkEY$K?7$7$/%=!<%9%3!<%I$+$i **defva** l?%*%j%8%J%kNCMrFI$_<h$ko1G"$k!#<!$N%;%C%7%g%sGb%=$NJQ?t$N@_Dj$r;H$$$?$$>l9gKO!" ‘.e Ey$N5/F0$NEY$K%m!<%I$5lk%U%!%$%k$G **setq** <0$r;H$CFCMr>e=q$-$9kI,MW,$"$k!#

;dKHCF$N **edit-options** %3%^%s%I$N<g$J;H$$F;$H$$$&NO!"<+J,$N ‘**.emacs**’ %U%!%$%k$G@_Dj$7$?$/$J h&$JJQ?t$r<(:6$7Fbi&$H$$$&bNG"$k!#$3$N%3%^%s%I$,=P$9%j%9%H$r8+F_k3Hr6/$/A&$aF*

Section “Editing Variable Values” in *The GNU Emacs Manual*, $r8+$l$P!"$h$j>\$7$$$3H,=q$+$l $F$$$k!#

16.3 ‘.emacs’ $N=q$-J}

Emacs $r5/F0$9kH!"%3%^%s%I%i%$%s$K ‘**-q**’ $r;XDj$7FFI_9~$^$J$$$h$&$K7?>l9g$r=|$-!" ‘**.emacs**’ % %$%k$,%m!<%I5l$k!# (**emacs -q** %3%^%s%IGO!"AGN^$^$N Emacs $,5/F0$5lk!#)

‘**.emacs**’ %U%!%$%k$O Lisp <0$r4^$s$G$$$k!#BgDqOCMr@_Dj9k$@$1$@$,!";~KO4X?tDj5A$,=q$+lF$$ Hb$"$k!#

=i4|2=%U%!%$%k$N4JC1$J@bL@$K$D$$$F$O!"<!$r;2>H!# Section “The Init File ‘~/.emacs’” in *The GNU Emacs Manual*.

3N>OGbF1$8$h$&$J3H$r@bL@$9kN$@$,!"$=$N:]!";d$,D9$/;HCF$-$?;d<+?H$N ‘**.emacs**’ $rAG:`$K$ HK9k!#

%U%!%$%k$N:G=i$NItJ,$O%3%a%s%H$+$iJk!#3l$O8D?ME*$J%a%bH7$FMxMQ$7$F$$$k!#L^O@!":#O=$NFk 0.$7$F$$$k$,!":G=i$O$=$&GOJ+C?!#

```
;;;; Bob's .emacs file
; Robert J. Chassell
; 26 September 1985
```

F|IU$r8+$F$_$h$&!* 3N%U%!%$%k$r;H$$=ia?NO?oJ,$H@N$N$@!#$=$l0JMh!"FbMF$rDI2C7F$-$?o1G"$

```
; Each section in this file is introduced by a
; line beginning with four semicolons; and each
; entry is introduced by a line beginning with
; three semicolons.
```

```
(F|K\8lLu)
; $3$N%U%!%$%k$N3F%;%/%7%g%s$O9TF,$,%;%_%3%m%s$G$"$k$h$&$J
; 9T$+$i;O$^$k!#$^$?!"3F9`L\$O9TF,$,;0$D$N%;%_%3%m%s$G$"$k
; $h$&$J9T$+$i;O$^$k!#
```

$3$3GO Emacs Lisp $N%3%a%s%H$NDL>o$NJX59>e$N47=,$r@bL@$7$F$$$k!#%;%_%3%m%s$G;O$^$k9T$OA4$F%3%a
G"$k!#Fs$D!";0$D!"$J$$$7$O;M$D$N%;%_%3%m%s$,%;%/%7%g%s$d%5%V%;%/%7%g%s$N$?$a$K;H$olk!# (%3%a
$D$$$F$N@bL@$O<!$r;2>H!# Section "Comments" in *The GNU Emacs Lisp Reference Manual.*)

```
;;;; The Help Key
; Control-h is the help key;
; after typing control-h, type a letter to
; indicate the subject about which you want help.
; For an explanation of the help facility,
; type control-h three times in a row.
```

```
(F|K\8lLu)
;;;; %X%k%W%-!<$K$D$$$F
; Control-h $,%X%k%W%-!<$G$"$k!#
; control-h $r%?%$%W$7$?8e!"8+$?$$%X%k%W$NFbMF$r<($9
; J8;z$r%?%$%W$9$k!#%X%k%W<+BN$N4JC1$J@bL@$r8+$k$K$O
; control-h $r;02s%?%$%W$9$l$P$h$$!#
```

$3$3GOFC$K `C-h` $r;02s%?%$%W9k3H$G%X%k%W$,I=<(5lk3HrCm0U7F$*$/!# (LuCp!' 3l$OL
Mule-2.3 (Emacs version 19.28) GOFs2s2!9@1GI=<(5l$?!#;EMM$,JQoC$?$N$@$H;W$&!#)

```
; To find out about any mode, type control-h m
; while in that mode.  For example, to find out
; about mail mode, enter mail mode and then type
; control-h m.
```

```
(F|K\8lLu)
; $"$k%b!<%I$,I$s$J$b$N$+CN$j$?$$>l9g$O!"$=$N%b!<%I$G
; control-h m $H%?%$%W$9$k!#Nc$($P!"mail mode $K$D$$$F
; CN$j$?$$>l9g$O mail mode $KF~$C$F$+$i control-h m $H
; %?%$%W$9$k!#
```

;dO3lr!V%b!<%I%X%k%W (mode help)!WHFIs$G$$$kN@$,!"BgJQJXMx$G$"$k!#IaDLO3lrFI$`$@1G
J3H,KX$IJ,$CF7$^$&!#

L^O@!"3Nh&$J%3%a%s%H$O '.emacs' %U%!%$%k$K4^akI,MWOJ$$!#;d$,$3li$r4^$a$?$N$O!"$h$/%b!
%k%WN3Hd%3%a%s%H$N=q$-J}$rK:$l$?$?a@!#$G!"$3lr8+lP;W$$5/$3$9$3$H$,=PMh$?o1G"$k!#

16.4 Text %b!<%I$H Auto Fill %b!<%I

5F!" Text mode $d Auto Fill mode $r%*%s$K9k2U=j$^$GMh$?!#

```
;;; Text mode and Auto Fill mode
; The next two lines put Emacs into Text mode
; and Auto Fill mode, and are for writers who
; want to start writing prose rather than code.
```

```
(F|K\8lLu)
;;; Text mode $H Auto Fill mode
; <!$NFs$D$N9T$O!"Emacs $r Text mode $d Auto Fill mode
; $K$9$k$?$a$N$b$N$G$"$k!#%3!<%I$r=q$/$h$j$OIaDL$NJ8>O
; $r=q$/$3$H$,B?$$?M8~$1$N@_Dj$G$"$k!#

(setq default-major-mode 'text-mode)
(add-hook 'text-mode-hook 'turn-on-auto-fill)
```

3l$,!"$3$N ‘.emacs’ NCfG!"I3$+$NK:lC$]$$?M4VN?aNHwK:O?0J30NAcsH7$?LrL\$r2L$?$
$NItJ,$G$"$k!#

3N3g8L$G64$^l?Fs9TNFbN:G=i$N0l9T$O!"%U%!%$%k$rFI$_9~$`:]$K!"$=$N%U%!%$%k$K C mode Nh$
Dj$N%b!<%I$,@_Dj5l$F$$$J$$>l9gKO Text mode $KF~$kh&K9kbNG$"$k!#

Emacs $O!"%U%!%$%krFI`:]K=$N3HD%;R$r8+$k!# (3HD%;R$H$$$&NO ‘.’$N8e$KB3$/ItJ,$G$"$k!#b7%U
%k$, ‘.c’ $d ‘.h’ $H$$$&3HD%;R$G=*$oCF$$$l$P!" Emacs $O C mode KJ$k!#$^$?!" Emacs $O%U%!%$%k$N
:G=i$N6u9T$G$J$$9T$b8+$k!#Nc$($P:G=i$N9T$K ‘-*- C -*-’ $H=q$+lF$$$l$P!" Emacs $O C mode KJ$k
Emacs $O<+F0H=JL$N$?$a$N3HD%;R$H%b!<%I;XDj$N%j%9%H$r;}CF$$$k!#99$K Emacs $O!"$=$N%P%C%U%!$N:G
%Z!<%8IU6a$K “local variable list” $,$"lP!"$=$l$b8+$k!#

3lKD$$$F$O!" *The GNU Emacs Manual* $N “How Major Modes are Chosen” $d “Local Variables
in Files” Ey$N%;%/%7%g%s$r;2>HN3$H!#

5F!" ‘.emacs’ %U%!%$%k$KLam&!#

b&0lEY!"5C$-$N9T$r=q$$$F$*$/!#3l$O2?$r9kNbN@m&!)

```
(setq default-major-mode 'text-mode)
```

3N9T$O!"C;$$$J$,$i$b40A4$J Emacs Lisp $N<0$G$"$k!#

2f!9$O4{$K `setq` KO47$l?F$7sG$$$k!#3l$O!"8e$KB3$/JQ?t `default-major-mode` r=$N8e$N `text-`
`mode` $H$$$&CM$K%;%C%H$9kbN@!# `text-mode` $N@hF,$N0zMQId$O!" Emacs $K `text-mode` $,%7%s%\%k$H7
2?$rI=$7$F$$$k$+$r8+kNGOJ/!"J8;zDLj=N^^{07}&h&;X<(9kbNG"$k!# `setq` Nh$j>\$7$$
$D$$$F$O<!$r;2>H!# Section 1.9, “JQ?tNCMN@_Dj”, p. 11. Bg@Z$J%]%$%s%H$O!" ‘.emacs’ GCMr%;%C%H9k<
B3$-$O!" Emacs $NB>$N>l=jGN<jB3$-$HA4$/0c$$$O$J$$$H$$$&3HG"$k!#

<!$OFs9TL\$G$"$k!#

```
(add-hook 'text-mode-hook 'turn-on-auto-fill)
```

3N9TGO!" `add-hook` %3%^%s%I$G `turn-on-auto-fill` $r `text-mode-hook` $H$$$&JQ?t$K2C$($F$$$k!#
`turn-on-auto-fill`$O%W%m%0%i%`$NL>A0G"$j!"L>A0$+$i?d;!$5lkDLjN3H$r9T$&!# Auto Fill mode $r
%*%sK9kNG"$k!#

Emacs $O Text mode $KF~$k$?$S$K!" Text mode $K%U%C%/ (hook) 5l$?%3%^%s%I$r<B9T9k!#=>CF!"
Emacs $, Text mode KJk4HK Auto Fill mode $b%*%s$KJko1G"$k!#

$^$Hak$H!":G=i$N9T$O!"FC$K3HD%;R$d:G=i$N6uGJ$$9T$d6I=jJQ?t$+iI$N%b!<%I$K7F$h$$$+J,iJ
KO Text mode KJkh$&@_Dj$9kbNG$"$k!#

Text mode GO!"J*=q$-$K$OJXMx$J9=J8%F!<%V%k$,@_Dj$5l?j9$k!#Nc$($P!"%"%]%9%H%m%U%# ‘’’ $OIa
J8;zh&$KC18l$N0lIt$@$H2r<a9k$,!"=*;_Id$d6uGr$OC18l$N0lIt$@$H$O9M$($J$$!#=>CF `M-f` GO ‘it’
BNrHtS1[$($F?J$`!#0lJ}!" C mode GO!" ‘it’s’ NAg&$I ‘t’$ND>8e$N0LCV$G;_$^$k!#

$^$?Fs9TL\$O!" Text mode $KF~$k:]$KF1;~$K Auto Fill mode $b%*%s$K9k$?$aNbNG$"$k!# Auto Fill
mode GO!" Emacs $O<+F0E*$KD9$$9T$r<!$N9T$K@^$jJV7F$/$l$k!#$=$N:]$O!"C18l$r@#CG$7$?$j$;$:A
C18l$HC18l$N4V$r@^$jJV9h$&$KJC$F$$$k!#

Auto Fill mode $,%*%U$KJC$F$$$k>l9g$O!"9T$O$"$J$?$,%?%$%W$7$F$$$/H=N^$^1&$K?-SF$$$/!#9T
C<$^$GE~C#7?>l9g!" `truncate-lines` NCMrI&@_Dj7F$$$k$+$KhC$F!"1&$NItJ,$,8+$(J/JC$?
0?$$$O1x$$7A$GI=<($5l?j9$k!#

16.5 %a!<%k$N%($%j%"%9

0J2<$, mail aliases Ey$r;H$($kh&K9$k `setq` <0!"5Z$S$=$lKD$$$F$NHwK:O?$G$"$k!#

```
;;; Mail mode
; To enter mail mode, type ‘C-x m’
; To enter RMAIL (for reading mail),
; type ‘M-x rmail’
```

(F|K\8lLu)

```
;;; Mail mode
; Mail mode $KF~$k$K$O!" ‘C-x m’ $H%?%$%W$9$k!#
; RMAIL (mail $rFI$`$?$a$N$b$N) $K$O$$$k$K$O!"
; ‘M-x rmail’ $H%?%$%W$9$k!#
```

```
(setq mail-aliases t)
```

3N **setq** %3%^%s%I$O!"JQ?t **mail-aliases** NCMr **t** $K%;%C%H$9$k!# **t** $O??$r0UL#9kNG!"3N9T$O!V$I
$>!" mail aliases $r;H$C$F2<$5$$!W$H$$$&0UL#KJ$k!#

Mail aliases $H$$$&NO!"D9$$EE;R%a!<%k%"%I%l%9$dEE;R%a!<%k%"%I%l%9$N%j%9%HKBP9$kJX59>e$NC;$$
N3HG$"$k!#$"$J$?$N ‘aliases’ $rJ]B8$7F*$/%U%!%$%k$O ‘~/.mailrc’ G"$k!# alias $O<!$Nh&$J7A<0
=q1P$h$$!#

```
alias geo george@foobar.wiz.edu
```

George $K%a%C%;!<%8$r=q$/>l9g$O!"%"%I%l%9$K ‘geo’ $H=q$/$@$1Gh$$!#9k$H%a%$%i!<$O<+F0E*$K ‘geo
%U%k%"%I%l%9$KE83+$7F/lk!#

16.6 Indent Tabs %b!<%I

Emacs $O%G%U%)%k%H$G$O!"%j!<%8%g%s$r@07A9k:]$KBt;3$N6uGr$NO"B3$K$O%?%V$rA^F~9k!# (Nc$($P$
$O!"Bt;3$N9T$r0lEY$K%$%s%G%s%H$9k?aK **indent-region** $r;H$C$?$j9k3H$@$m$&!#) %?%V$OC<Kv$dI
$N0u:~$G$Oe:No$K8+$($k!#7TEX7GO%?%V$OL5;k$5lk$?$a$KTEX"$Td Texinfo $r;H$&:]KO=PNO$,1x$/
JCF7$^$&!#

<!Nh$&$K9l$P!" Indent Tabs mode $r%*%U$K=PMh$k!#

```
;;; Prevent Extraneous Tabs
(setq-default indent-tabs-mode nil)
```

3N9TGO!":#$^$G;HCF$-$? **setq** GOJ/ **setq-default** $r;H$C$F$$$k3H$KCm0U$7h&!# **setq-
default** %3%^%s%I$O!"$=$NJQ?t$KBP9k%P%C%U%!%m!<%+%kJCM,$J$$>l9g$K8B$j!"$=$NCM$r%;%C%H$9$k!#

The GNU Emacs Manual NCfN “Tabs vs. Spaces” $d “Local Variables in Files” $r;2>H!#

16.7 4vD+$N%-!<%P%$%s%G%#%s%0

<!$O!"4v$D$+$N8D?ME*$J%-!<%P%$%s%G%#%s%0$N@_Dj$G$"$k!#

```
;;; Compare windows
(global-set-key "\C-cw" 'compare-windows)
```

compare-windows $O!"8=:_$N%&%#%s%I%&$H<!$N%&%#%s%I%&NCfN%F%-%9%H$rHf3S$7F/lk$H$$$&!"^/M
%3%^%s%IG"$k!#$3lO!"3F!9$N%&%#%s%I%&$NCf$N%]%$%s%H$N0LCV$+$iHf3S$r3+;O7F!"N>J}$,F1$8G"$
?J$`!#;d$O3N%3%^%s%I$r$$$D$bMxMQ$7$F$$$k!#

$^$?!"3l$r8+$l$P!"A4$F$N%b!<%I$KBP9kBg0hE*$J%-!<%P%$%s%G%#%s%0$r@_Dj$9$kJ}K!$,J,$k!#

%3%^%s%I$O **global-set-key** $@!#$3$N8e$K%-!<%P%$%s%G%#%s%0$,B3$/!# ‘.emacs’ %U%!%$%kGO%-!<%P%$
%G%#%s%0$O>e$K<(7?DLjNJ}K!$G=q$+lk!# **\C-c** $O ‘control-c’, D^$j!"!Vcontrol %-!<$H **c** $rF1;~$K2!$9
3H$rI=$o$9!#$^$?!" **w** $O!V**w** $r2!$9!W3H$rI=$o$9!#@bL@$NCfGO!" **C-c w** Nh$&$K=q$+$l$k!# (CTL %-

OJ$/ M-c Nh$&$J META %-!<$r;HC?%P$$%s%Ir7$?$$>l9g$O!" \M-c Nh$&$K=q$/!#>\$7$/$O<!$r;2>
Section “Rebinding Keys in Your Init File” in *The GNU Emacs Manual*.)

3N%-!<$G8F$S=P5l$k%3%^%s%I$O **compare-windows** G"$k!#$3$N;~!" **compare-windows** $N@hF,$K0zMQ
IdrIU1k3HKCm0U7h$&!#$=$&$7$J$$$H!" Emacs $O:G=i$K3N%7%s%\%kNCMrI>2A7h$&$H7F7^$

Fs=E0zMQId$H!" ‘C’ $NA0$N%P%C%/%9%i%C%7%e!"5Z$SC1FH$N0zMQId$N;0$D$O%-!<%P%$%s%G%#%s%0KOI,?\$G
b+$+$oi:!";dOh$/K:$lF7$^$&!#9,$$$J3H$K!"$3li$O ‘.emacs’ $r8+$l$P;W$$=P$9$3H,=PMh$k!

C-c w $H$$$&%-!<%P%$%s%G%#%s%0$=NbNK$D$$$F$b=q$$$F$*$/!#3l$O!" C-c $H$$$&A0CV%-!<$H0lJ8;
:#$N>l9g$O w— $+$iJC$F$$$k!#3Nh&$J C-c $KB3$1$F0lJ8;z$H$$$&%-!<@_Dj$O!"FC$K8D?ME*$JMQES$
lF$$$k!#b7$"$J$?$, Emacs $r3HD%$7$?$$>l9g!"3liN%-!<$r8x$NMQES$K;H$o$J$$$GM_$7$$!#$=$NBe$
C-c C-w Nh$&$J%-!<$r;H$&Y-G"$k!#$=$&$G$J$$$H8D?MMQ$K%P%$%s%I9k%-!<$,$J$/$JCF7^$&!#

0J2<$K%3%a%s%HIU$-$GB>$N%-!<%P%$%s%G%#%s%0$r=q$$$F$*$/!#

```
;;; Keybinding for ‘occur’
; I use occur a lot, so let’s bind it to a key:
; (;d$O occur $r$h$/;H$&$N$G!"%-!<$K%P%$%s%I$7$F$*$/!#)
(global-set-key "\C-co" ’occur)
```

occur %3%^%s%I$O!"8=:_$N%P%C%U%!NCfG@55,I=8=$K%^%C%A$9$kItJ,$r4^$‘9T$rA4$FI=<($7F/lk%3%
G"$k!#%^%C%A$7$?9T$O!" ‘*Occur*’$H$$$&%P%C%U%!$KI=<($5lk!#3N%P%C%U%!O=$N0LCV$K4JC1KHtV$
$b;H$olk!#

<!$K!"%-!<%P%$%s%G%#%s%0$N2r=|$N;EJ}$r<($9!#FCDj$N%-!<%P%$%s%G%#%s%0$r;H$(J/9ko1G"$k!#

```
;;; Unbind ‘C-x f’
(global-unset-key "\C-xf")
```

3N%-!<%P%$%s%G%#%s%0$r2r=|9kNK$OM}M3$,$"$k!#;d$O!"<+J,$,h/ C-x C-f $H%?%$%W7h$&$H7
0cCF C-x f $H%?%$%W7F7^$&$3HK5$$,IU$$$?!#%U%!%$%k$rFI$_9~$b$&$H7F!"6vA39T5MaNI}$r@_
7^$&$o1G$"$k!#7k2LE*$KBgDq$OJQ$JI}$,@_Dj5lF7$^$&!#;dO3$NI}$rJQ99$9$k3HOKXI$J$$$N$
%-!<%P%$%s%G%#%s%0$r2r=|9k3HK7$?$N$@!#

<!$O8=:_$N%-!<$r%P%$%s%I$7D>$9bNG"$k!#

```
;;; Rebind ‘C-x C-b’ for ‘buffer-menu’
(global-set-key "\C-x\C-b" ’buffer-menu)
```

%G%U%)%k%HGO!" C-x C-b $O **list-buffer** %3%^%s%I$r5/F0$9kbNG$"$k!#3N%3%^%s%I$O8=:_$N%P%C%U
$N%j%9%H$rJL$N%&%#%s%I%&$KI=<(9k!#;d$OBgDq$O$=$N%&%#%s%I%&$G2?$+r7$?$$$3H,B?$$$N$G **buffer-**
%3%^%s%I$NJ}$,9%$-$G$"$k!#3l$OC1$K%P%C%U%!$N%j%9%H$rI=<(9k$@$1GJ$/!"%]%$%s%Hr=$N%&%#%s%
F0$7$F$/$l$k!#

16.8 %U%!%$%k$N%m!<%I

GNU Emacs $N%3%_%e%K%F%#$NBt;3$N?M!9$, Emacs $N3HD%$r9TCF$-$?!#;~$,7P$DKD$l!"$3li$N3HD
?7$7$$%j%j!<%9$K4^$^lk3H$bB?$/JC$?!#Nc$($P%+%l%s%@!<$dF|5-$N%Q%C%1!<%8$O:#$d Emacs version
$NG[I[$N0lItKJCF$$$k!#3liOI8=‘$N Emacs version 18 $NG[I[$K$O4^$^lF$$$J$+$C$?$bN@!#

(;d$O Calc $b Emacs $NBg@Z$J0lIt$@$H9M$($F$$$k!#%Q%C%1!<%8$,Bg$-$$$?aKJLG[I[$N7A$r<hCF$O$$
NN!"3l$bI8=‘$NG[I[$N0lIt$H8@$($k$@$m$&!#)

load %3%^%s%I$r;H$&$H!"%U%!%$%k$NCf?HA4$F$rI>2A$9k3H,=PMh$k!#=>$C$F!"$=$N%U%!%$%k$N4X?t$dJ
A4$F Emacs $K%$%s%9%H!<%k9k3H$,2DG=$@!#Nc$($P!"

```
(load "~/emacs/kfill")
```

$H$$$&#S<0$O!"%[!<%`%G%#%l%/%H%j$N ‘emacs’ $H$$$&%5%V%G%#%l%/%H%j$N2<$N ‘kfill.el’ %U%!%$%k$rI>2
B($A%m!<%I$9$k!# ($b$7%P%$%H%3%s%Q%$%k$5l? ‘kfill.elc’ $,$"lP!"$=$Ai,%m!<%I5l$k!#$3CA$N
B.$/%m!<%I!"<B9T=PMh$k!#)

(‘kfill.el’ $O!" Kyle E. Jones $N ‘filladapt.el’ %Q%C%1!<%8$r Bob Weinere $,2~B$$7$?$b$N
$G!"!V$9C-jH7F!"3&k5$$$/$J$$@^jJV75Z$S%Q%i%0%i%U$N9T5MarDs6!$7!"%K%e!<%9$d%a!<%k!
Lisp, C++, Postscript $d%7%'%k%3%^%s%I$Js+$r4^$a$F%$%s%G%s%H7F$/$l$k!W%Q%C%1!<%8$G$"$k!#;dO3$
h/MxMQ9kNG!"I8=`$NG[I[$NCf$K4^$aF/lk3H$r4j$C$F$$$k!#)

Bt;3$N3HD%%Q%C%1!<%8$r%m!<%I7?$$>l9g$O!">e$Nh&K=$N%U%!%$%k$N0LCV$r@53N$K;XDj$9kNGO
$"$k%G%#%l%/%H%j$r Emacs $N load-path$K;XDj9kHh$$!#;dO=$&$7$F$$$k!#3N>l9gKO!" Emacs
%U%!%$%k$r%m!<%I9k:]$K%G%U%)%k%H$N%G%#%l%/%H%j$N%j%9%H$K2C$($F$=$N%G%#%l%/%H%j$b8!:w$7F/l
Jk!# (%G%U%)%k%H$N%G%#%l%/%H%j$O Emacs $r:n@.$9$k:]$K ‘paths.h’ $G;XDj$5lk!#)

<!$N%3%^%s%I$G!" ‘~/emacs’ %G%#%l%/%H%j$r8=:_$N%m!<%I%Q%9$K4^$ak3H,=PMh$k!#

```
;;; Emacs Load Path
(setq load-path (cons "~/emacs" load-path))
```

$D$$$G$K8@$CF*$/$H!" load-library $O4X?t$r%m!<%I9k:]$N%$%s%?%i%/%F%#%V$J%$%s%?!<%U%'!<%9$b
7F$/$l$k!#$3$N4X?t$N40A4$J%3!<%I$O<!Nh$&$KJC$F$$$k!#

```
(defun load-library (library)
  "Load the library named LIBRARY.
This is an interface to the function ‘load’."
  (interactive "sLoad library: ")
  (load library))
```

load-library $H$$$&4X?t$NL>A0$G$O ‘library’ $H$$$&8@MU$rJX59E*$K ‘file’ $NF10U8l$H7F8+$F$$$k!#
load-library %3%^%s%I$N%=!<%9$O ‘files.el’ %i%$%V%i%j$+iMhF$$$k!#

3lHAgC$H0c$&$F0:n$r9k%$%s%?%i%/%F%#%V$J%3%^%s%IH7$F!" load-file $,$"$k!#$3l, loa
library HI$&0c$&$+$K$D$$$FNh$j>\$7$$>pJs$O<!$r;2>H!# Section “Libraries of Lisp Code for Emacs”
in *The GNU Emacs Manual*.

16.9 %*!<%H%m!<%I

$=$N4X?t$r4^$`%U%!%$%k$r%m!<%I7?$j!"4X?tDj5A$rD>@\I>2A7?j7$F%$%s%9%H!<%k9kBeoj$K!"$=
$,<B:]$K:G=i$K;H$olk$^$G$O%$%s%9%H!<%kO7$J$$$,!"$$$DGb8F$S=P$;$k>uBV$KO7F*$/$H$$$&3
$k!#$3lO%*!<%H%m!<%I (*autoloading*) $H8F$Plk!#

%*!<%H%m!<%I5l$?4X?t$r<B9T9k$H!" Emacs $O<+F0E*$K$=$NDj5A$r4^$`%U%!%$%k$rI>2A7F!"$=$N4X?
$S=P$9!#

%*!<%H%m!<%I4X?t$r;H$&$H Emacs rh$jB.$/5/F0=PMh$k!#$H$$$&Nb5/F0;~KO$=$N%i%$%V%i%j$O%m!<%
$J$$$+i@!#$=$NBeoj!":G=i$K%*!<%H%m!<%I$5l?4X?t$r;H$&:]KO!"$=$l$r4^$`%U%!%$%k$rI>2A9k4
HBT?5lk3HKJk!#

aC$?$K;Hol$J$$4X?tO7P7$P%*!<%H%m!<%I$5lk!# ‘loaddefs.el’%i%$%V%i%j$K$O bookmark-set $
$i wordstar-mode $^$G2?I4bN%*!<%H%m!<%I5l$k4X?t$,4^$^$l$F$$$k!#L^O@!"8D?ME*K3li$N!V$a$C
;HoJ$$!W4X?t$rIQHK$K;H$&$3HKJk3Hb"k+b7lJ$$!#3N>l9g$O!"$=$N4X?t$N%U%!%$%k$r loa
;HCF .emacs %U%!%$%k$NCf$G%m!<%I$7F*$/$Y$-$@m&!#

;d$N Emacs version 19.23 MQ$N ‘.emacs’ %U%!%$%k$G$O!"85!9%*!<%H%m!<%I$5lkh&$J4X?t$r4^$` 17 $N%i
%$%V%i%j$,%m!<%I5l$F$$$k!# (<B:]KO!"3liN4X?t$r!Vdump!W$7$? Emacs $r:n$kY-JN$@$,!"K:
$$$?N@!# dump KD$$$F$N>\$7$$>pJs$O!" Section “Building Emacs” in *The GNU Emacs Lisp Reference Manual*, $d ‘INSTALL’ $r8+$FM_$7$$!#)

0?$$$O$^$? ‘.emacs’ %U%!%$%k$K%*!<%H%m!<%I<0$r=q$-$?$$$3Hb$"$k$@$m$&!# autoload $O8^$D$N0z?t$
$kAH9~$_4X?tG"$j!":G8e$N;0DN0z?t$O>JN,2DG=$G$"$k!#:G=i$N0z?t$O%*!<%H%m!<%I9k4X?t$NL>A0!"F

0z?t$O%m!<%I$5lk%U%!%$%kL>!";0HVL\$O4X?t$N@bL@J8!";MHVL\$O$=$N4X?t$r%$%s%?%i%/%F%#%V$K8F$S=P$
$&$+!"$=$7$F:G8e$N8^HVL\$N0z?t$O!"%*%V%8%'%/%H$N%?%$%W — **autoload** $O4X?t$@1GJ/!"%-!<%^%C%W$c
%m$b07$(kN$G — G"$k!# (%G%U%)%k%H$O4X?tG"$k!#)

0J2<$KE57?E*$JNc$r5s$2$k!#

```
(autoload 'html-helper-mode
  "html-helper-mode" "Edit HTML documents" t)
```

3N<0$O!" **html-helper-mode** 4X?t$r!" '**html-helper-mode.el**' %U%!%$%k$N$+$i%m!<%I9k!# (0?$$$O!"
b7 '**html-helper-mode.elc**' $,$"lP!"$=$Ai+iFI_9~$`!#) 3N%U%!%$%k$O **load-path** $G;XDj$5l?
%G%#%l%/%H%jKCV+lF$$$J1lPJiJ$$!#@bL@J8rFI`$H!"$3lO HyperText Markup Language $G=q
l?J8=q$rJT=8$9k?aN%b!<%IG"k3H,J,$k!#$3$N%b!<%I$O **M-x html-helper-mode** $H%?%$%W9k$
$G%$%s%?%i%/%F%#%V$K8F$S=P$9$3H,=PMh$k!# ($3$N>l9g!"%*!<%H%m!<%I<0$N@bL@J8KO@55,$N@bL@J8$r$=
J#<L9kI,MW$,$"$k!#@55,$N@bL@J8O^$@%m!<%I$5lF$$$J$$$N$G!"$^$@FI$a$J$$$o1G$"$k!#)

>\$7$/$O!"<!$r;2>H!# Section "Autoload" in *The GNU Emacs Lisp Reference Manual.*

16.10 AgCH7?3HD%: line-to-top-of-window

<!$K!"%]%$%s%HN"$k9T$r%&%#%s%I%&$N:G>eCJ$K0\F0$9$k4JC1$J Emacs $N3HD%$r=q$$$F$*$/!#3l$r;H$
%-%9%H$r4JC1$K8+k3H,=PMhkN$G!";d$OIaCJh/MxMQ7F$$$k!#

<!$N%3!<%I$rJL%U%!%$%k$K7F!"$=$l$r '**.emacs**' $G%m!<%I$7FbNI$$$7!"%3!<%I$rD>@\ '**.emacs**' NCfK4
F7$^$&3H$b=PMh$k!#

0J2<$,Dj5A$G$"$k!#

```
;;; Line to top of window;
;;; replace three keystroke sequence  C-u 0 C-l
(defun line-to-top-of-window ()
  "Move the line point is on to top of window."
  (interactive)
  (recenter 0))
```

<!$K%-!<%P%$%s%G%#%s%0G"$k!#

BgDq$N Emacs version 18 MQ$N '**.emacs**' %U%!%$%k$O!"$=$N$^$^ version 19 GbF0$/$N$@$,!"dO$j4v$D$+
$N0c$$$,$"$k!# (L^O@ Emacs 19 GN?7$7$$5!G=b"$k!#)

Version 19 $N Emacs GO!"%U%!%s%/%7%g%s%-!<$r '**[f6]**' Nh$&$K=q$/$3H,=PMh$k!# Version 18 GO
%U%!%s%/%7%g%s%-!<$r2!$7$?;~$K%-!<%\!<%I$+$iAwil$k%-!<%9%H%m!<%/$r;XDj7J1lPJiJ$+$C$?!
Zenith 29 %-!<%\!<%IGO!" 6 HVL\$N%U%!%s%/%7%g%s%-!<$r2!$9$H **ESC P** $,Aw$ilk$7!" Ann Aubor Ambassador %-!<%\!<%IGO **ESC O F** $,Aw$ilk!#3liN%-!<%9%H%m!<%/$O3F!9 '**\eP**' 5Z$S '**\eOF**' Nh$&$K=q$+
k3HKJk!#

;d$O version 18 $N '**.emacs**' GO **line-to-top-of-window** $rC<Kv$N%?%$%W$K0MB8$9$k%-!<$K%P%$%s%I$7
$F$$$k!#

```
(defun z29-key-bindings ()
  "Function keybindings for Z29 terminal."
  ;; ...
  (global-set-key "\eP" 'line-to-top-of-window))

(defun aaa-key-bindings ()
  "Function keybindings for Ann Arbor Ambassador"
  ;; ...
  (global-set-key "\eOF" 'line-to-top-of-window))
```

(%U%!%s%/%7%g%s%-!<$r2!$7$?;~$KI&$$$&%-!<%9%H%m!<%/$,Aw$ilk$+$O!" C-h l (view-lossage) $H%?%
9k3HGCNk3H$,=PMh$k!#3l$O!":G8e$K%?%$%W$7$? 100 $N%-!<%9%H%m!<%/$rI=<(7F$/$l$k!#)

%-!<%P%$%s%G%#%s%0$r;XDj7?8e$O!"C<Kv%?%$%W$K=>$C$F!"$=NIAi$+$N%-!<%P%$%s%G%#%s%0$rA*Br$
$rI>2A$9$k!#$,!"$=$NA0$K0JA0Dj5A$5l?%G%U%)%k%H$N%-!<%P%$%s%G%#%s%0$r:o=|$9$k!#$=$&$7$J$$$H!"D
D+C?>l9g$K '.emacs' GN%-!<%P%$%s%G%#%s%0$,>e=q$-$5lk!#

```
;;; Turn Off Predefined Terminal Keybindings

; The following turns off the predefined
; terminal-specific keybindings such as the
; vt100 keybindings in lisp/term/vt100.el.
; If there are no predefined terminal
; keybindings, or if you like them,
; comment this out.

(setq term-file-prefix nil)
```

0J2<$,A*Br$N$?$a$N#S<0$G$"$k!#

```
(let ((term (getenv "TERM")))
  (cond
   ((equal term "z29") (z29-key-bindings))
   ((equal term "aaa") (aaa-key-bindings))
   (t (message
       "No binding for terminal type %s."
       term))))
```

Emacs version 19 GO!"4X?t%-!<$O (%^%&%9%\%?%s%$%Y%s%H$dHs%"%9%-!<J8;z$HF1MM) 0zMQIdL5$7$N3Q3g8
$/$/CF=q$/$3H,=PMh$k!#;d$O<!Nh$&$K7F line-to-top-of-window $r%U%!%s%/%7%g%s%-!< F6 $K%P%
%s%I7F$$$k!#

```
(global-set-key [f6] 'line-to-top-of-window)
```

3CANJ}$,$:CHC1=c$@!*

hj>\$7$$$3HK$D$$$F$O!"<!$r8+$FM_$7$$!# Section “Rebinding Keys in Your Init File” in *The GNU Emacs Manual*.

Emacs 18 $H Emacs 19 $NN>J}$rAvi;$F$$$k>l9g!"<!Nh$&$J>r7oJ,4t$r;H$C$F!"$IAi$N%3!<%I$r;H$
$rA*Br$9k3H,=PMh$k!#

```
(if (string=
     (int-to-string 18)
     (substring (emacs-version) 10 12))
    ;; evaluate version 18 code
    (progn
       ... )
  ;; else evaluate version 19 code
  ...
```

16.11 %-!<%^%C%W

Emacs OI$N%-!<$rIN%3%^%s%I$K%P%$%s%I9k$+$r *keymaps* $r;H$C$F5-O?$9$k!# C mode $d Text mode
Nh$&$JFCDj$N%b!<%I$O!"$=$l<+?H$N%-!<%^%C%W$r;}CF$$$k!#%b!<%IFH<+$N%-!<%^%C%W$O!"A4FN%P%C%
M-5l$k global map $r>e=q$-9k!#

global-set-key 4X?t$O global keymap $N%-!<$r%P%$%s%I$7$?$j:F%P%$%s%I$7$?$j9k!#Nc$($P<!$N#S<0
$O!"%-!< C-c C-l $r4X?t line-to-top-of-window $K%P%$%s%I9k!#

```
(global-set-key "\C-c\C-l" 'line-to-top-of-window)
```

%b!<%IFH<+$N%-!<%^%C%W$O define-key 4X?t$r;H$C$F%P%$%s%I5l$k!#$3lO!"%-!<$d%3%^%s%I$HF1;~$K
$N%-!<%^%C%W$b0z?t$K<h$k!#Nc$($P;d$N ‘.emacs’ %U%!%$%kGO!" texinfo-insert-@group %3%^%s%I$r C-c
C-c g $K%P%$%s%I9k$?$a$K!"<!$Nh&$J#S<0$,=q$+$l$F$$$k!#

```
(define-key texinfo-mode-map "\C-c\C-cg"
  'texinfo-insert-@group)
```

texinfo-insert-@group 4X?t$=$NbN$O!" Texinfo %U%!%$%k$K ‘@group’ $r%$%s%5!<%H9k$?$aNAgC$H
7? Texinfo mode $N3HD%$G$"$k!#;dO3$N%3%^%s%I$r$$$D$b;H$&NG!"O;DN%-!<%9%H%m!<%/ **@ g r o u**
hj$b;0$D$N%-!<%9%H%m!<%/$G$"$k C-c C-c g $r;H$&J}$,$:CHJXMxJN$@!#(‘@group’ $HBP1~$9$k ‘@en
group’ OCfN%F%-%9%H$r0l$D$N%Z!<%8$K<}ak$?$a$N%3%^%s%I$G$"$k!#3NK\$NCf$N!"Bt;3$NJ#?t9T$KEO
‘@grouip ... @end group’ $G0O$^lF$$$k!#)

0J2<$, texinfo-insert-@group $N4X?tDj5A$G$"$k!#

```
(defun texinfo-insert-@group ()
  "Insert the string @group in a Texinfo buffer."
  (interactive)
  (beginning-of-line)
  (insert "@group\n"))
```

(%?%$%W?t$r@aLs9k$?$aKO!"L^O@!"C18l$rA^F~$9$k4X?t$rDj5A7?j9kBeojK Abbrev mode $r;H
Hb=PMh$k!#$7$+$7!"%-!<%9%H%m!<%/$,B>$N Texinfo mode $N%-!<%P%$%s%G%#%s%0$HD4OB$,<hlF$$$k$H$$
L#$G!";d$O>e$NJ}K!$NJ}$,9%$_G"$k!#)

‘loaddefs.el’ $r8+$l$P ‘c-mode.le’ $d ‘lisp-mode.el’ Nh$&$JMM!9$J%b!<%I%i%$%V%i%j$HF1;~$KBt;3
$N *define-key* <0$,=q$+$l$F$$$kN,J,$k!#

%-!<%^%C%WKD$$$F$N>\:Y$O<!$r;2>H$N3H!# Section “Customizing Key Bindings” in *The GNU Emacs Manual*, 5Z$s Section “Keymaps” in *The GNU Emacs Lisp Reference Manual*.

16.12 X11 GN%+%i!<I=<(

X Window system $r;H$&$H!" Emacs version 19 $r%+%i!<$G;H$&$3H,=PMh$k!# ($3l^GK5s2?A4FN
Nc$O!" Emacs version 18 Gb Emacs version 19 GbF0$/$O$:$G$"$k!#$,!"$3$3$NNc$O Emacs version 19
GN$_F0:n$9$k!#)

;d$O%G%U%)%k%H$N%+%i!<$,5$$KF~iJ$$$N$G!"<+J,FH<+$N?’$r;XDj$7$F$$$k!#

;d$N;XDj$O!"BgDq$N X $N=i4|2=%U%!%$%kK"kbNG$"$k!#dC$?$3HrHwK:O?H7$F<+J,$N ‘.emacs’
=R7F$$$k!#

```
;; I use TWM for window manager;
;; my ~/.xsession file specifies:
;    xsetroot -solid navyblue -fg white
```

<B:]$O!" X window $N%k!<%H$O Emacs $N01It$JIG$OA4$/$J$$!#$,!"$Hb+$/=q$$$F$*$/3HK7$?!#

```
;; My ~/.Xresources file specifies:
;     XTerm*Background:    sky blue
;     XTerm*Foreground:    white
;     emacs*geometry:      =80x40+100+0
```

```
;     emacs*background:    blue
;     emacs*foreground:    grey97
;     emacs*cursorColor:   white
;     emacs*pointerColor:  white
```

<!$+$i$,!"‘.emacs’ GCMr@_Dj7F$$$k#S<0$NItJ,$G$"$k!#

```
;;; Set highlighting colors for isearch and drag
(set-face-foreground 'highlight "white" )
(set-face-background 'highlight "slate blue")
(set-face-background 'region    "slate blue")
(set-face-background
 'secondary-selection "turquoise")

;; Set calendar highlighting colors
(setq calendar-load-hook
      '(lambda ()
         (set-face-foreground 'diary-face   "skyblue")
         (set-face-background 'holiday-face "slate blue")
         (set-face-foreground 'holiday-face "white")))
```

?'!9$J?'9g$$$N@D$,!"%9%/%j!<%s$NAiD-$+$i;d$N4c$r<i$j!"$=7FL~7F$/$l$k!#

16.13 V19 GN;(B?$J;vJA

0J2<$O!" Emacs version 19 MQ$N:Y$+$$@_DjG"$k!#

– <+F0E*KI,MWJ$@$1%_%K%P%C%U%!NBg-5rJQ99$9$k!#

```
(resize-minibuffer-mode 1)
(setq resize-minibuffer-mode t)
```

– 8!:wJ8;z$r%O%$%i%$%HI=<($9$k!#

```
(setq search-highlight t)
```

– A4FN%U%l!<%`$G%a%K%e!<%P!<$rI=<($7!"%^%&%9$r$=$N%U%l!<%`>e$K0\F0$7$?$H$-$K>eKMhkh&K

```
(setq default-frame-alist
      '((menu-bar-lines . 1)
        (auto-lower . t)
        (auto-raise . t)))
```

–

%^%&%9%+!<%=%k$N?'$H7A$N@_Dj!#

```
; Cursor shapes are defined in
; ‘/usr/include/X11/cursorfont.h’;
; for example, the ‘target’ cursor is number 128;
; the ‘top_left_arrow’ cursor is number 132.

(let ((mpointer (x-get-resource "*mpointer"
                                "*emacs*mpointer")))
  ;; If you have not set your mouse pointer
  ;;     then sent it, otherwise leave as is:
  (if (eq mpointer nil)
      (setq mpointer "132")) ; top_left_arrow
  (setq x-pointer-shape (string-to-int mpointer))
  (set-mouse-color "white"))
```

16.14 %b!<%I9T$N=$@5

:G8e$K!"%b!<%I9T$N=$@5$K$D$$$F=RYk!#$3$1$,JQ99=PMh$kh&KJCF$$$kNOK\Ev$K4r$7$$!#

;d$O;~!9%M%C%H%o!<%/>e$G;E;vr9kN$G!"DL>o%b!<%I9T$N:8B&$K=q$+lF$$$k ‘Emacs: ’ $r%7%9%F%` A0$GCV-49($F$$$k — $=$&7J$$$H!";d$,8=:_$I$N%^%7%s$N>e$G;E;v$r7F$$$k$+K:$lF7$^$&$+$i$G 99$K!"IN%G%#%l%/%H%j$K$$$?$+$rK:lJ$$$h$&$K%G%U%)%k%H$N%G%#%l%/%H%j$N%j%9%H$b=q$$$F$$$k!# ‘Line’ $,0n$lk?aK!" line point $r on K7$?!#0J>e$N@_Djr9$k ‘.emacs’ $N5-=R$O0J2<NDLjG" $k!#

```
(setq mode-line-system-identification
  (substring (system-name) 0
             (string-match "\\..+" (system-name))))
(setq default-mode-line-format
      (list ""
            'mode-line-modified
            "<"
            'mode-line-system-identification
            "> "
            "%14b"
            " "
            'default-directory
            " "
            "%[("
            'mode-name
            'minor-mode-alist
            "%n"
            'mode-line-process
            ")%]--"
             "Line %l--"
            '(-3 . "%P")
            "-%-"))

;; Start with new default.
(setq mode-line-format default-mode-line-format)
```

default $N%b!<%I9T$N%U%)!<%^%C%H$O Info Nh$&$JMM!9$J%b!<%I$,>e=q$-$9k3Hr5v9h$&$K7?!#%j%9 Cf$NB?$/$NMWAG$O!"L>A0$+$iLrL\$,?dB,=PMhkh$&$KJC$F$$$k!#Nc$($P **mode-line-modified** $O%P%C%U% =$@5$5$l$?>l9g!"$=lr65$($F$/$lkh$&$K9kJQ?t$@$7!" **mode-name** $O%b!<%I$NL>A0$r65$(F/lk!"Ey

‘"%14b"’ $O8=:_$N%P%C%U%!$NL>A0$r ($*Fk@w$_$N **buffer-name** 4X?t$r;HCF) I=<(9k!# ‘14’ $OI=<($9$kJ ;z?t$N:GBg$N;XDj$G$"$k!#$=$lhj$bJ8;z?t$,>/$J$$>l9g$O6uGrJ8;z$GKdaF$/$l$k!# ‘%[’ $H ‘%]’ $O3F!9$ JT=8%l%Y%k$K1~$8$F3Q3g8L$NAH$rI=<($9kbNG$"$k!# ‘%n’ $O%J%m!<%$%s%0r7$F$$$k;~$K ‘Narrow’ $HI= F/lk!# ‘%P’ $O%P%C%U%!A4BN$G%&%#%s%I%&$N:G2<CJ$h$j>e$K$"$kItJ,$,2?%Q!<%;%s%H$"k+!"b7$/$O $+ ‘Bottom’ $+$rI=<(7F$/$l$k!# (>.J8;z$N ‘p’ K9kH!"%&%#%s%I%&$N:G>eCJ$h$j>e$NItJ,$,$IN/$i$$ I=<(9k!#) ‘%-’ $O9T$N;Djr%@%C%7%e (LuCp!’ ‘-’ N3$H) GKdaF/lk!#

Emacs version 19.29 0J9_GO!" **frame-title-format** $r;H$C$F Emacs $N%U%l!<%`$K%?%$%H%k$rI=<($9 k3H,=PMh$k!#3NJQ?t$O **mode-line-format** $HF1$89=B$$r7F$$$k!#

%b!<%I9T$N%U%)!<%^%C%H$K$D$$$F$O!"<!$K@bL@$,$"$k!# Section “Mode Line Format” in *The GNU Emacs Lisp Reference Manual*.

(LuCp!’ Nemacs $d Mule GOF|K\8l%3!<%I$dB?9q8l%3!<%I$N>uBV$rI=<($9k?aK3HD%$,2C$(il$F$$ **default-mode-line-format** $r0lEYI>2A$7FCMrD4$Y!"$=lr85$K=$@5$9$kHh$$$@m&!#)

b&0lEY!VEmacs $r9%$-KJk?aK Emacs $r9%$-KJkI,MWO$J$$!#!W$H$$$&8@MU$r;W$$=P7FM_7
$"$J$?<+?H$N Emacs $O%G%U%)%k%H$N Emacs HO0[Jk?'$d0[$J$k%3%^%s%I!"$=7F0[Jk%-!<%^%C%W$r;}
H,=PMhkN$@!#

0lJ}$G!"$b$7!VH"$+$i<h$j=P7?$^$^$N!W%+%9%?%^%$%:5l$F$$$J$$AG$N Emacs $r5/F0$7$?$$>l9g$O!"<
$&$K%?%$%W$7h&!#

```
emacs -q
```

3&9k$H!" Emacs O"J?$N=i4|2=%U%!%$%k ‘~/.emacs’ $r%m!<%I$7$J$$$G5/F0$9$k!#3l$,AG$N$^$^$
%U%)%k%H$N Emacs G"$k!#

17 %G%P%C%0

GNU Emacs OFsD$N%G%P%C%,$r;}CF$$$k!# debug $H edebug G"$k!#:G=iNbNO!" Emacs $NFbIt$K
AH9~$^$l$F$$$F!">o$K;H$($k>uBV$K$"$k!#FsHVL\$NbN$O3HD%5!G=$H7FM?$($ilF$$$kbN$G!" version
$OI8=`$NG[I[NCfK4^$^$l$F$$$k!#

3liN%G%P%C%,$O6&$K!"0J2<$N=j$KHs>o$K>\$7$/@bL@$5lF$$$k!# Section "Debugging Lisp Program"
in *The GNU Emacs Lisp Reference Manual*. 3N>OGO!"3F!9$N4JC1$JNc$r8+$F$$$/3HK9$k!#

17.1 debug

Nc$($P$"$J$?$,!" 1 $+$iM?$($il??t$^$GNOBr7W;;9k$?$a$N4X?t$NDj5A$r=q$$$?H7h&!# (3l$O
@bL@7? triangle 4X?tG"$k!#<!$N=j$G>\$7$/5DO@$5lF$$$k!# Section 11.1.4, "8:>/9k%+%&%s%?$r;H
$?%k!<%W", p. 88.)

7+7J$,$i!"$"$J$?$N4X?tKO%P%0$,$"C?H7h&!#Nc$($P '1-' $H=q$/Y-H3mr '1=' $H=q$$$F$
$?$H9k!#3N4V0c$$$r7?%W%m%0%i%`$O0J2<$NDLjG$"$k!#

```
(defun triangle-bugged (number)
  "Return sum of numbers 1 through NUMBER inclusive."
  (let ((total 0))
    (while (> number 0)
      (setq total (+ total number))
      (setq number (1= number)))      ; $3$3$G%(%i!<
    total))
```

b7!"3NJ8>O$r Info GFIs$G$$$kJi!"3N4X?t$r$$$DbNh&$KI>2A$9k3H,=PMh$k!#$=$&$9k
%3!<NN0hKO triangle-bugged $HI=<($5lkO:$@!#

5F!" triangle-bugged $r0z?t 4 HHbKI>2A7F$_h&!#

```
(triangle-bugged 4)
```

9k$H!"<!$Nh&$J%(%i!<%a%C%;!<%8$r<u$1<h$kO:$@!#

```
Symbol's function definition is void: 1=
```

<B:]$O!"$3Nh$&$JC1=c$J%P%0$J$i!"%(%i!<%a%C%;!<%8$@1GI&=$@5$9lP$h$$$+J,k@m&!#7+$
$J$$>l9gOI$&$9lP$h$$$+!)

debug-on-error NCMr t H9k3HG!"%G%P%C%0$r3+;O$9k3H,=PMh$k!#

```
(setq debug-on-error t)
```

3&7F$*$/$H!" Emacs $O<!$K%(%i!<$KAx6x$7$?;~$K%G%P%C%0$KF~$k!#

5U$K debug-on-error $r nil K9kH!"%G%P%C%0KOF~iJ$$!#

```
(setq debug-on-error nil)
```

GO!" debug-on-error $r t K7$F!"<!$rI>2A7F$_h&!#

```
(triangle-bugged 4)
```

:#EY$O Emacs $O '*Backtrace*' $H8F$Plk%P%C%U%!$r@8@.$7$?$O$:$@!#3l$O0J2<$Nh&JbN@!#

```
---------- Buffer: *Backtrace* ----------
Signalling: (void-function 1=)
  (1= number))
  (setq number (1= number)))
  (while (> number 0) (setq total (+ total number))
        (setq number (1= number))))
  (let ((total 0)) (while (> number 0) (setq total ...)
        (setq number ...)) total))
  triangle-bugged(4)
  eval((triangle-bugged 4))
  eval-last-sexp(nil)
* call-interactively(eval-last-sexp)
---------- Buffer: *Backtrace* ----------
```

(>eOAgCHP$+$j=$@5$7F"$k!#<B:]$O%G%P%C%,$OD9$$9T$r@^$jJV7?jO7J$$!#)

'*Backtrace*' rFI`;~$O!"2<$+$i>e$K8~$+$CFFIs$G$$$/!#$=$&9k$H!" Emacs $,$INh$&$K7F%(%
$r=P$9$K;j$C$?$+$,J,$k!#:#$N>l9g!" Emacs $O C-x C-e (eval-last-sexp) $r%$%s%?%i%/%F%#%V$K8F$S=P
$7!"$=$N7k2L$H7F triangle-bugged <0$rI>2A$7$F$$$k!#>e$N3F!9$N9T$+$i Lisp %$%s%?%W%j%?$,<!$K2?
I>2A7F$$$C$?$+$,J,$k!#

>e$+$i;09TL\$O

```
(setq number (1= number))
```

G"$k!# Emacs O3$N#S<0$rI>2A7h$&$H7?!#$=N?aK!"FbIt$N#S<0$rI>2A$7h&H7$?!#$=l,>e$
9TL\$N<0G"$k!#

```
(1= number)
```

%(%i!<$,@8$8$?$N$O!"$3$3$G$"$k!#0l9TL\$KO=$&=q$+lF$$$k!#

```
Signalling: (void-function 1=)
```

$=$3$G%(%i!<$r=$@5$7!":F$S4X?tDj5A$rI>2A7F!"b&0lEY%F%9%H7F$_$k3HKJ$k!#

b7!" Info G3lrFIsG$$$kJi!"$3$3$G2<$N<0$rI>2A$7$F debug-on-error $r nil KLa7F*3&!

```
(setq debug-on-error nil)
```

17.2 debug-on-entry

$"$k4X?tKBP7$F debug $r<B9T$9$kFsHVL\$NJ}K!$O!"4X?t$r8F$S=P$9;~$K%G%P%C%0$KF~$kJ}K!$G$"$k!#$
$O debug-on-entry $r;H$&!#

$^$:!"<!Nh$&$K%?%$%W$7F_h&!#

```
M-x debug-on-entry RET triangle-bugged RET
```

$=$7$F!"<!$rI>2A9k!#

```
(triangle-bugged 5)
```

Emacs $O '*Backtrace*' %P%C%U%!$r:n@.$7!" triangle-bugged 4X?t$NI>2A$N3+;O$rCNi;F/$k!#

```
---------- Buffer: *Backtrace* ----------
Entering:
* triangle-bugged(5)
  eval((triangle-bugged 5))
  eval-last-sexp(nil)
* call-interactively(eval-last-sexp)
---------- Buffer: *Backtrace* ----------
```

'*Backtrace*' %P%C%U%!NCfG!" d $H%?%$%W7F$_$h$&!#$9kH!" Emacs $O triangle-bugged $N:G=i$N
#S<0$rI>2A$9$k!#$3NH$-%P%C%U%!$O<!Nh$&$KJk!#

```
---------- Buffer: *Backtrace* ----------
Beginning evaluation of function call form:
* (let ((total 0)) (while (> number 0) (setq total ...)
        (setq number ...)) total))
  triangle-bugged(5)
* eval((triangle-bugged 5))
  eval-last-sexp(nil)
* call-interactively(eval-last-sexp)
---------- Buffer: *Backtrace* ----------
```

$3$3$G!"$fC/jH!"99$K 8 2s d $r%?%$%W7F$_$h$&!# d $H%?%$%W9k4H$K!" Emacs $O4X?tDj5A$NCf$N
#S<0$rI>2A$7$F$$$/!#7k2LH7$F!"$3$N%P%C%U%!$O<!Nh$&$KJk!#

```
---------- Buffer: *Backtrace* ----------
Beginning evaluation of function call form:
* (setq number (1= number)))
* (while (> number 0) (setq total (+ total number))
        (setq number (1= number))))
* (let ((total 0)) (while (> number 0)
        (setq total ...) (setq number ...)) total))
  triangle-bugged(5)
* eval((triangle-bugged 5))
  eval-last-sexp(nil)
* call-interactively(eval-last-sexp)
---------- Buffer: *Backtrace* ----------
```

:G8e$K!"99$K 2 2s d $r%?%$%W9k$H Emacs $O%(%i!<$N2U=j$^$GC)jCe/!#$=$N7k2L '*Backtrace*' $N>e$+
Fs9T$O<!$Nh&KJ$k!#

```
---------- Buffer: *Backtrace* ----------
Signalling: (void-function 1=)
* (1= number))
...
---------- Buffer: *Backtrace* ----------
```

d $H%?%$%W9k3H$G!"4X?t$r0lD:$D<B9T$7$F$$$/3H$,=PMh$k!#

'*Backtrace*' %P%C%U%!$rH4$1kK$O q $H%?%$%W9k!#3&9k$H%H%l!<%9$OH4$1$k$,!" debug-on-entry
$O%-%c%s%;%k$7$J$$!#

debug-on-entry $=$NbN$rL58z$K9kKO!" cancel-debug-on-entry $K8F$S=P7F4X?tL>$rF~NO$9$l
Ph$$!#<!Nh$&$J46$8$@!#

```
M-x cancel-debug-on-entry RET triangle-bugged RET
```

(b7$3$l$r Info GFIs$G$$$kJi!"$3$3$G debug-on-entry $rL58z$K7F$*$3$&!#)

17.3 debug-on-quit $H (debug)

debug-on-error $r%;%C%H$7$?$j **debug-on-entry** $r8F$S=P7?j9$k0J30$KbFsDDx!" **debug** $r3+;O$9$kJ}K!$,$"$k!#

0lDOJQ?t **debug-on-quit** $r **t** $K%;%C%H$9k3HG!"3&9k$H **C-g** (**keyboard-quit**) $r%?%$%W9k3H$G>o$K **debug**$r3+;O$9k3H,=PMh$k!#$3lOL58B%k!<%W$r%G%P%C%0$9$k:]$KM-8zG"$k!#

b&0lDO!"%3!<%INCfN%G%P%C%0$r3+;O$7$?$$=j$K (**debug**) $r8F$S=P$99T$rA^F~9kJ}K!G"$k!#Nc$$Nh&$J46$8G"$k!#

```
(defun triangle-bugged (number)
  "Return sum of numbers 1 through NUMBER inclusive."
  (let ((total 0))
    (while (> number 0)
      (setq total (+ total number))
      (debug)                           ; %G%P%C%,5/F0
      (setq number (1= number)))      ; $3$3$G%(%i!<
    total))
```

debug 4X?t$O<!$NCf$G>\$7$/@bL@$5lF$$$k!# Section "The Lisp Debugger" in *The GNU Emacs Lisp Reference Manual*.

17.4 %=!<%9%l%Y%k$N%G%P%C%, edebug

Edebug $ODL>o%G%P%C%0$r7F$$$k%3!<%I$N%=!<%9$rI=<(7F$/$l$k!#$=7F!"8=:_IN9T$r<B9T$7$F$$r:8B&$NLp0u$G<(7F$/$l$k!#

4X?t$r0l9T$4HK<B9T9k3H$b=PMh$k$7!"<B9T$r;_ak *breakpoint*$N=j$^$G0l5$$KAvi;k3Hb=PMh

Edebug KD$$$F$O<!$K=j$K@bL@$,$"$k!# Section "Edebug" in *The GNU Emacs Lisp Reference Manual*.

<!$K%P%0$r4^s@ **triangle-recursively** $N4X?tDj5A$r5s2F$*$/!#3lKD$$$FI|=,7?$$>l9gKO<!$r;2>H!# Section 11.2.2, "%+%&%s%?NBeojK:F5"$r;H$&", p. 91. 3NNc$O!"2<$K@bL@5l$F$$$kh& **defun** $N:8$N%$%s%G%s%HL5$7$GI=<($5lF$$$k!#

```
(defun triangle-recursively-bugged (number)
  "Return sum of numbers 1 through NUMBER inclusive.
Uses recursion."
  (if (= number 1)
      1
    (+ number
       (triangle-recursively-bugged
        (1= number)))))                ; $3$3$G%(%i!<
```

IaDL$O!"$3$N4X?tDj5A$r%$%s%9%H!<%k$9kK$O%+!<%=%k$r4X?t$N:G8e$NJD$83g8L$N8e$G **C-x C-e** (**eval-last-sexp**) $H%?%$%W9k$+!"4X?tDj5AFb$K%+!<%=%k$rCV$$$F **C-M-x** (**eval-defun**) $H%?%$%W9k!# (%G%U%)%k%H$O **eval-defun** %3%^%s%I$O Emacs Lisp mode $+ Lisp Interaction mode G7$+F0:n$7$J$$!#)

7+7J$,$i!" Edebug $r;H$CF3$N4X?t$r%G%P%C%0$9$k:]KO!"$^$::G=iKJLN4X?t$r;H$C$F!"%3!<%IN)$F (*instrument*) r9kI,MW,$"$k!# Emacs version 19 GO4X?tDj5AFb$G<!$Nh&$K%?%$%W9k!#

```
M-x edebug-defun RET
```

3&9k3H$G!"$b$7 Edebug $, Emacs $K%$%s%9%H!<%k5l$F$$$J1l$P<+F0E*$K%$%s%9%H!<%k$7!"4X?t@Z$KA7N)$F9k!# (Edebug $r%m!<%I$7$?8e$O!" Edebug $NI8=`E*$J%-!<%P%$%s%G%#%s%0$,;H$($kh&KJ Nc$($P **edebug-defun** $r **C-u C-M-x** (**eval-defun** $NA0CV0z?tIU$-$N<B9T) $G<B9T=PMh$k!#)

Emacs version 18 GO<+J,$G Edebug $r%m!<%I$7J1$1$PJi$J$$!#$=$1KO ‘.emacs’ $KE,@Z$J load %3 %^%s%I$r=q$$$F$*$1Ph$$!#

b7$3$1$r Info NCfGFIsG$$$kJi!"$3$3$G>e$N triangle-recursively-bugged 4X?t$NA7N)$Fr9 $k!#$=$N:]$K4X?tDj5A$N defun $N9T$,%$%s%G%s%H$5$1$F$$$k$H!" edebug-defun $,Dj5A$NHO0O$rFCDj=PMh$ JCF7$^$&NG!">e$K5s$2$?Nc$G$O:#$^$GF~$1$F$$$? defun $N:8$N%9%Z!<%9$r=|$$$F$"$k!#

4X?t$NA7N)$Fr7$?8e!"%+!<%=%k$r<!$N#S<0$N$9$08e$K;}$C$F$$$C$F C-x C-e (eval-last-sexp) $H%?%$% 7h$&!#

```
(triangle-recursively-bugged 3)
```

9k$H triangle-recursively-bugged $N%=!<%9$KLaCF%+!<%=%k$,$3$N4X?tFb$N if $N9T$N:G=i$K0\F0$9 $k!#$^$?!" ‘=>’ $H$$$&Lp0u$,$=$N9T$N:8B&$KI=<($5$1$k!#3NLp0u$O4X?t$,<B9T$5$1$F$$$k>l=j$r;X$7F

```
=>⋆(if (= number 1)
```

NcNCfG!"@10u ‘⋆’ $O%]%$%s%H$rI=$7$F$$$k ($3$1$O Info GO ‘-!-’ $HI=<($5$1$k!#)!#

5F!"$3$3$G SPC $r2!$9$H!"%]%$%s%H$O<!$K<B9T$5$1$k#S<0$K0\F0$9$k!#=>CF!"3N9T$,<!$Nh&K

```
=>(if ⋆(= number 1)
```

B3$1$F SPC $r2!$7$F$$$/$H!"%]%$%s%H$O#S<0$+$i#S<0$X$H0\F0$7$F$$$/!#F1;~$K#S<0$,CMrJV9$4$HK= %(%3!<NN0h$KI=<($5$1$k!#Nc$($P%]%$%s%H$, number $N=j$rDL2a9k$H!"<!$Nh&$KI=<($5$1$kO:$@!#

```
Result: 3 = C-c
```

$3$1$O number NCM, 3!"D^$j;0HVL\$N ASCII %3!<%IG"$k ASCII CTL-C G"k3Hr0UL#7F$$$k!# (($O%"%k%U%!%Y%C%H$N;0HVL\$NJ8;zG"$k!#) (LuCp!’2K$J?M$O (char-to-string 3) Ey$rI>2A7F$_$h$&!#)

3&7F%(%i!<N"$k9T$^$G0\F0$9k3H,=PMh$k!#$3$1$rI=<(9kD>A0KO!"3N9T$O<!$Nh&$KI=< $$$k!#

```
=>        ⋆(1= number)))))               ; $3$3$G%(%i!<
```

$3$3Gb$&0lEY SPC $r2!$9$H<!$Nh&$J%(%i!<%a%C%;!<%8$,I=<($5$1$k!#

```
Symbol's function definition is void: 1=
```

$3$1$,%P%0$G$"$k!#

Edebug $r=*N;$9kK$O ‘q’ $r2!$;Ph$$!#

3N4X?tDj5A$NA7N)$F$r2r$/KO!" C1$KA7N)$F7J$$$h$&$J%3%^%s%IG=$N4X?t$rI>2A7J$*$;Ph$$ $P!"4X?tDj5A$N:G8eNJD83g8L$N8e$G C-x C-e $H%?%$%W9k$@$1Gh$$!#

Edebug $OC1$K4X?t$r0l$D$:$D<B9T7F$$$/$@$1GOJ/B>KbBt;3N3Hr7F$/$1$k!#<+F0E*$K4X? 9T7F$$$C$F%(%i!<$,5/$-$?=j$G;_$^kh$&$K@_Dj9k3H$b=PMh$k$7!"FCDj$N>l=j$G;_$^kh$&$K9k$ G=G"$k!#MM!9$J#S<0NCMNJQ2=$rI=<($5$;$k3H$b=PMh$k$7!"$"$k4X?t$,2?2s<B9T$5$1$?$+$bD4$Yk3$ $k!#$=$NB>$K$b$$$m$$$mJ3H,=PMh$k!#

Edebug KD$$$F$O<!$G@bL@$5$1$F$$$k!# Section “Edebug” in *The GNU Emacs Lisp Reference Manual*.

17.5 %G%P%C%0KD$$$F$NN}=,LdBj

- count-words-region 4X?t$r%$%s%9%H!<%k$7!"$=1r8F$S=P$7$?;~$KFbIt%G%P%C%,$,5/F0$9kh$&$K$7 $5$$!#FsDNC18l$r4^$`$h$&$J region $N>e$G$3$N4X?t$r<B9T$7$J$5$$!# d $r$+$J$j$N2s?t2!$9I,MW$, $@$m$&!#$"$J$?$N %7%9%F%`GO3N%3%^%s%I$,=*N;$7$?;~E@$G2?$+%U%C%/$,8FP1$^$9$+!) (%U%C%/$ FN>pJs$O<!$r;2>H!# Section “Command Loop Overview” in *The GNU Emacs Lisp Reference Manual*.)

- **count-words-region** $r '***scratch***' %P%C%U%!$K%3%T!<$7$F!"I,MW$J$i **defun** $N@hF,$N%9%Z!<%9$r<h $j=|$$$F$+$i!"3N4X?t$r Edebug N?aKA7N)F7J5$$!#$=$7$F!"$3$N4X?t$r 1 %9%F%C%W$:$D<B9T $5$$!#3N>l9g!"I,$:$7$b4X?t$K$O%P%0$,$"$kI,MWOJ$$!#%P%0$,$"C?J}$,$h1l$P%P%0$r@_Dj$7 $$!#b7$3$N4X?t$K%P%0$,J1lP!"LdBjJ/:G8e$^$G<B9T=PMhkO$:$@!#
- Edebug $r<B9T$7$F$$$k4V$K!"? $H%?%$%W7FA4FN Edebug $N%3%^%s%I$N%j%9%H$r8+$J$5$$!# (**global edebug-prefix** $OIaDL **C-x X**!"$D$^$j **CTL-x** $KB3$/BgJ8;z$N **X** KJCF$$$k!# Edebug $N%G%P%C%0 %P%C%U%!$N30GN%3%^%s%IKO3NA0CV%-!<$r;H$&h&K9$k!#)
- Edebug $N%G%P%C%.%s%0%P%C%U%!$G **p** (**edebug-bounce-point**) %3%^%s%I$r;H$C$F%j!<%8%g%s$N2?=h$G **count-words-region** $,F0:n$7$F$$$k$+$r8+J5$$!#
- %]%$%s%H$r4X?t$N2<$NJ}$K;}$C$F9T$-!" **h** (**edebug-goto-here**) %3%^%s%I$r%?%$%W9k3HG=$N>l=j %8%c%s%W$7J5$$!#
- **t** (**edebug-trace-mode**) %3%^%s%I$r;H$C$F!" Edebug $,<+J,<+?H$G4X?t$N>e$rAvkh$&$K7J$5$$!#F1 MM$KBgJ8;z$N **T** $r;H$C$F **edebug-Trace-fase-mode** $KF~$jJ5$$!#
- %V%l!<%/%]%$%s%H$r@_Dj$7!"$=$N0LCV$^$G Edebug $r Trace mode GAvi$;J5$$!#

18 $^$H$a

3NF~Lg=qO3lG=*ojG"$k!#0J>e$G$"$J$?$O Emacs Lisp GN%W%m%0%i%_%s%0KD$$$F==J,3X$s
$G!"CM$r%;%C%H7?$j!"4JC1$J '.emacs' %U%!%$%k$r<+J,<+?H$dM'?M$N$?$a$K=q$$$?$j!" Emacs KAgC$H
%+%9%?%^%$%:$d3HD%$r;\$9$3$H$,=PMh$kh&KJCF$$$kO:G"$k!#

bCHb!"3l$O0l$D$NCJ3,$K2a$.$J$$!#K>$`$J$i!"$bCH@h$K?J$_!"<+J,<+?H$G3X$s$G$$$/3H$,=PMh

$3$3$+$i$O GNU Emacs $N%=!<%9$d *The GNU Emacs Lisp Reference Manual* JI$,;29M$KJk$@$m
$&!#

Emacs Lisp $N%=!<%9$r8+k3HO0l<o$NC58!$G$"$k!#%=!<%9rFIs$G8+47$l$J$$4X?t$d#S<0$K=P0)C?
KO!"$=$l$,2?$G$"$k$+$r2rFI7?$jD4$Y$?$j7J1lPJiJ$$!#

$^$:%j%U%!%l%s%9%^%K%e%"%k$r3+$3$&!#$3lOE0Dl7F=q$+$l$?!"40A4$J!"7+bFI_d9$$ Emacs Lis
@bL@=qG"$k!#$3lO=ON}<TN?a@1GOJ$/!"$"J?$,8=:_CN$C$F$$$kh&$JCN<1$7$+$J$$?M8~1K$
$F$$$k!# (*Reference Manual* $OI8=`E*$J GNU Emacs $NG[I[$K4^$^$l$F$$$k!#3NF~Lg=q$HF1MM!"$3lk
Texinfo $N%=!<%9%U%!%$%kH7$FG[I[$5lF$$$k!#=>CF!"%*%s%i%$%s$GbFIak7!"%?%$%W%;%C%H$7$F0u
$?K\$H7FbFI`3H$b=PMh$k!#)

$^$?!"B>$N GNU Emacs ImB0$N%*%s%i%$%s%X%k%W$bFIsG$_$h$&!#A4$F$N4X?t$K$O@bL@J8;zNs$,$D$$$F
$7!" **find-tags** $H$$$&%=!<%9$r8+$D1F$/$l$k%W%m%0%i%`$b$"$k!#

NcH7$F;d$,%=!<%9$rC58!$9$kJ}K!$r>R2p7h$&!#$b$&?oJ,$H@NN3HKJk$,!":G=i$K;d$O!"$=$NL>A
lF '**simple.el**' $H$$$&%U%!%$%k$r8+$?!#1}!9$K7F$=$sJbN@$,!" '**simple.el**' NCfN4vD+$N4X?t$C
;($@$C$?!#>/$J$/$H$b!"$QCH8+KOJ#;($=$&$K8+$($?!#Nc$($P0lHV:G=i$N **open-line** 4X?t$+$i7F!"$$$
J#;($H$$$&46$8$@!#

$"$J$?$O!"3N4X?t$r **forward-sentence** 4X?t$N;~$Nh&$K!"$fC/jHD/a?$$$+b7lJ$$!# (Section 12.3, "**forward-sentence**", p. 96.) 0?$$$O3N4X?tOHtP7FB>NbCH4JC1$=$&$J **split-line**
Ey$N4X?t$r8+$?$$$+b7lJ$$!#3liN4X?t$rA4$FFI$`I,MW$O$J$$!# **count-words-in-defun** $r;H$&$H
split-line 4X?t$O 27 8D$NC18l$H%7%s%\%k$r4^sG$$$k3H$,J,$k!#

split-line $O!"$=$NC;$5Kb4Xoi$:!"$^$@2f!9$,3XsG$$$J$$;MDN#S<0$r4^$s$G$$$k!# **skip-char
forward**!" **indent-to**!" **insert**!"$=$7$F '**?\n**' G"$k!#

Nc$($P **insert** 4X?t$r9M$(F_h&!# (3lKD$$$F$OI|=,$N%;%/%7%g%sG"$k<!$N=jGAg3CH?($
$F$$$k!#) Chapter 12, "@55,I=8=$N8!:w", p. 95. Emacs >e$G **C-h f** (**describe-function**) $KB3$1$F
insert$H%?%$%W9l$P!"$3$N4X?t$K$D$$$Fhj>\$7$$$3HrCNk3H,=PMh$k!#$3lO4X?t$N@bL@J8;zNs$
7F$/$l$k4X?t$G$"$k!#%=!<%9$r8+$k>l9g$O **find-tag** $r;H$&!#3l$O **M-.** $K%P%$%s%I5l$F$$$k!# (b
$b:#$N>l9gKO$"$^jLrKN)$?$J$$!#3N4X?t$O Lisp GOJ/ C $G=q$+l?%W%j%_%F%#%V$@$+i@!#)
$K!"$3$N4X?t$K$D$$$F$N%j%U%!%l%s%9%^%K%e%"%k$N5-=R$O<!$Nh&K7$FC5$;$k!#$^$: Info $r5/F0$9$k!
$F **i** (**Info-index**) $KB3$1F3$N4X?t$NL>A0$r%?%$%W9k!#b7$/$O0u:~5l$?%^%K%e%"%k$N%$%s%G%C%/%9
insert $rC5$7Fb$h$$!#

F1MM$K!" '**?\n**' $N0UL#$bD4Yk3H$,=PMh$k!# **Info-index** $G '**?\n**' $rC5$7F_kH$h$$!#dCF_kH
k,3l$O<:GT$9$k!#$7$+$7D|aF$O$$$1$J$$!#%$%s%G%C%/%9$G '**?**' L5$7$N '**\n**' $rC5$7F_lP!"%^%K%
NCfG4X78$9$k%;%/%7%g%s$r8+$D1k3H$,=PMh$k!# ('**?\n**' $,2~9TJ8;z$rI=7F$$$k3H$O<!$N=j$K=P$F$
Section "Character Type" in *The GNU Emacs Lisp Reference Manual*.)

skip-chars-forward $H **indent-to** $G2?$,9Tol$F$$$k$+$O?d;!9k3H$,=PMh$k$@$m$&!#L^O@>\$7
$/8+$k3H$@$C$F=PMh$k!# ($D$$$G$@$,!" **describe-function** 4X?t$=$NbN$O '**help.el**' K"$k!#$3$1
$O!"D9$$$3dKO2rFI7d$9$$4X?t$N0l$DG"$k!#$3lNDj5A$r8+$l$P!"$I$&$dCFI8=`$NJ8;z%3!<%I$r;H
interactive <0$r%+%9%?%^%$%:=PMhk+H+!"I&dC$F%F%s%]%i%j%P%C%U%!$r@8@.9k$+$H$$$&3H$,J,

B>$NLLGr$$%=!<%9H7FO!" '**paragraphs.el**' $d '**loaddefs.el**' $=$l$K '**loadup.el**' JI$,$"2i
lk!# '**paragraphs.el**' %U%!%$%k$K$O!"D9$$4X?t$@$1GJ$/C;$/$F4JC1$KM}2r=PMh$k4X?t$b4^$^$l$F$$$
'**loaddefs.el**' %U%!%$%k$K$OBt;3$NI8=`%*!<%H%m!<%I<0$dBt;3$N%-!<%^%C%W$,4^$^lF$$$k!# '**loadup.el**'
Emacs $NI8=`ItJ,$r%m!<%I9k%U%!%$%k$G$"$k!#3l$r8+$l$P!" Emacs $,$I$&$$$&U&$K:n@.$5lk$+$,

J,$k!# (Emacs $N:n@.$K$D$$$F$O<!$r;2>H!# Section “Building Emacs” in *The GNU Emacs Lisp Reference Manual*.)

A0Kb8@C?h&$K!"$3l^GK Emacs $NItIJ$K$D$$$F$O$$$/i+3X=,7F$-$?!#7+$7!"$3lOBg@Z$
JN$@$,!"%W%m%0%i%_%s%0$NB?$/$NItJ,$K$D$$$F$O?($lk3HO=PMh$F$$$J$$ItJ,$,B?$$!#;d$O>pJs$N%=!
$$$F$O4{$KDj5A5l$? `sort` 4X?t$r;H$&$3$H0J30A4$/?(lk3H$,=PMh$J$+$C$?!#$^$?!"JQ?t$d%j%9%H$r;H
0J30$N;vJA$K$D$$$F$O!"Nc$($P>pJs$rCyaF$*$/KOI&7?$i$$$$$+$H$$$C$?$3HK$b?($lilJ+C
%0%i%`$r=q$/%W%m%0%i%`KD$$$F$bF1MM$@!#3liNOCBjKD$$$F$O!"B>$NJL$N<oN`$NK\$GK\=qHO0[J
BV$G3X$VY-G"m&!#

Hb$+$/!"0J>e$G GNU Emacs $r;H$C$FBt;3$N<B:]$N;E;v$r9k=`Hw$,@0$C$?!#=PH/E@$KC)$jCe$$$?o1
$k!#$3lO;O$^$j$N=*$ojJN@!#

Appendix A 4X?t the-the

J8>O$r=q$$$$F$$$$k$H!";~!9C18l$rFs=E$K=q$$$$F7^$&$3H,$"$k — Nc$($P "you you" (LuCp!'86J8GO<B
3NJ8$N@hF,$G you $,Fs=E$KJC$F$$$$k!#) $H=q$$$$F7^C?j9$k!#8D?ME*$K$O "the" rh$/Fs=E$K=q$$
$^$&!#$=$3$G!"Fs=E$KJC$F$$$$kC18l$r8+$D1k4X?tN3Hr **the-the** $H8F$V3HK9$k!#

$^$::G=i$NCJ3,$H7F!"<h$j4:$($:<!$N@55,I=8=$r;H$($P!"$3Nh$&$JFs=E$NC18l$rI=8==PMh$=$&$J$3
$k!#

```
\\(\\w+[ \t\n]+\\)\\1
```

3N@55,I=8= ($NA0H>) $O0l$D0J>e$NC18l9=@.J8;z$KB3$$$$F0l$D0J>e$N%9%Z!<%9!"%?%V$J$$$$7$O2~9T$,$/$k
%^%C%A9k!#7+$7!"$3$1$G$OFs9T$KEOkbNO8+D1il$J$$!#$H$$$$&Nb!":G=i$NC18l$N=*oj$K2~
$?>l9g$K!"<!$N9T$NF1$8C18l$N8e$K%9%Z!<%9$,MhlP%^%C%A7J$$$$+iG$"$k!# (@55,I=8=KD$$$$F$N>\
Chapter 12, "@55,I=8=$N8!:w", p. 95, $d Section "Syntax of Regular Expressions" in *The GNU Emacs Manual*, $=$1$K Section "Regular Expressions" in *The GNU Emacs Lisp Reference Manual*, $r;2>H!#)

C1$KC18l$NItJ,$@$1$r8!:w$9lP$h$$$$NGO$H9M$(k+b7lJ$$$$,!"3lGO 'with the' NCfN 'th' $N
JbN^$G0z$C$+$1F7$^$&!#

>eHOJL$N@55,I=8=8!:w$G!"C18l9=@.J8;z$KB3$$$$FHsC18l9=@.J8;z$,B3$-!"99$K:G=i$NC18l$,Mh$kbN$
9kbN$,$"$k!#<!$N<0$G '\\w+' $O0l$D0J>e$NC18l9=@.J8;z$K%^%C%A$7!"'\\W*' $ONm8D0J>e$NHsC18l9=@.
$K%^%C%A$9$k!#

```
\\(\\(\\w+\\)\\W*\\)\\1
```

$,!"$3lbLr$KN)$?$J$$!#

<!$K;d$,;HCF$$$$kbN$r5s$2$k!#$3lO40A4GO$J$$$$,!"==J,;H$$$$bNKJk!#'\\b' $OC18l$N;O$^$j$
$O=*$ojN6uJ8;zNs$K%^%C%A$7!"'[^@ \n\t]+' $O0l$D0J>e$N @ %^!<%/!"6uGr!"2~9T!"$b7/$O%?%V$N$$$$:
bJ$$$J8;z$NO"B3$K%^%C%A9k!#

```
\\b\\([^@ \n\t]+\\)[ \n\t]+\\1\\b
```

bC$HJ#;($J<0$r=q$/3H$b=PMh$k$,!";d<+?H$O3N<0$G==J,$G$"$k$HJ,$C$?$N$G!"$3lr;HCF$$$$k!#

0J2<$, **the-the** 4X?t$G$"$k!#3l$r;H$$$$d$9$$$$%-!<%P%$%s%G%#%s%0$H6&$K '.emacs' %U%!%$%k$K5-=R$7$
$k!#

```
(defun the-the ()
  "Search forward for for a duplicated word."
  (interactive)
  (message "Searching for for duplicated words ...")
  (push-mark)
  ;; This regexp is not perfect
  ;; but is fairly good over all:
  (if (re-search-forward
       "\\b\\([^@ \n\t]+\\)[ \n\t]+\\1\\b" nil 'move)
      (message "Found duplicated word.")
    (message "End of buffer")))

;; Bind 'the-the' to  C-c \
(global-set-key "\C-c\\" 'the-the)
```

0J2<$,%F%9%HMQ$NJ8>OG"$k!#

```
one two two three four five
five six seven
```

4X?tDj5ANCfN@55,I=8=$r>e$K5s2?B>$N@55,I=8=$GCV-49($F!"$3$N%j%9%H$N>e$G;n$7F_k3Hb=P

Appendix B Kill %j%s%0$N07$$

kill %j%s%0$O **rotate-yank-pointer** $NF/$-KhCF%j%s%0$N7ABV$KJQ49$5$l$?%j%9%H$G$"$k!# **yank** 5Z$S
yank-pop %3%^%s%I$O **rotate-yank-pointer** 4X?t$rMxMQ$7$F$$$k!#3N Appendix GO!" **yank** $d **yank-pop** $H6&$K!" **rotate-yank-pointer** 4X?t$b@bL@$9k3HK9k!#

B.1 4X?t rotate-yank-pointer

rotate-yank-pointer 4X?t$O **kill-ring-yank-pointer** $,;X$9 kill %j%s%0$NMWAG$rJQ99$9$k!#Nc$(
$P!":#$^$G **kill-ring-yank-pointer** $,FsHVL\$NMWAG$r;X$7$F$$$?Ji!"$=$l$r;0HVL\$NMWAG$KJQ99$9$k!#

3l$, **rotate-yank-pointer** $N%3!<%I$G$"$k!#

```
(defun rotate-yank-pointer (arg)
  "Rotate the yanking point in the kill ring."
  (interactive "p")
  (let ((length (length kill-ring)))

    (if (zerop length)

        ;; then-part
        (error "Kill ring is empty")

      ;; else-part
      (setq kill-ring-yank-pointer
            (nthcdr (% (+ arg
                          (- length
                             (length
                              kill-ring-yank-pointer)))
                       length)
                    kill-ring)))))
```

3N4X?t$OJ#;($=$&$K8+$($k$,!"$$$DbDLj4vD+$NItJ,$KJ,1F9M$($k$H!"$9C-jHM}2r=PMh$k!#:
AH$_$r8+F_h&!#

```
(defun rotate-yank-pointer (arg)
  "Rotate the yanking point in the kill ring."
  (interactive "p")
  (let varlist
    body...)
```

3N4X?t$O **arg** $H$$$&0z?t$r01$D<h$k!#$^$?!"4JC1$J@bL@J8;zNs$,$D$$$F$*$j!">.J8;z$N '**p**' Kh$j%$%
%/%F%#%V@k8@5l$F$$$k!#3l$O!"0z?t$,=hM}5l$?A0CV0z?t$G$"$j!"?tH7$F4X?t$KEO5lJ1lPJ
Hr0UL#7F$$$k!#

4X?tDj5A$NK\BN$O **let** <0G"$j!"$3lOJQ?t%j%9%H *varlist* $HK\BNItJ,$+iJ$k!#JQ?t$O **length** $H8F$P$
kill %j%s%0$NMWAG$N?t$K%P%$%s%I5l$k!#$3$N?t$O!" **length** $H$$$&4X?tKhCFD4Yilk!# (3N4X?t$,
?t **length** $HF1$8L>A0G"k3HKCm0U7h$&!#$Kb+$+$oi:0lJ}GO4X?tL>H7$F;H$o$l!"$b$&JRJ}$
L>H7$F;H$olF$$$k!#3NFsDO$-$AsH6hJL5l$F$$$k!#F1MM$K!"1Q8l$rOC$9?M!9$O '**ship**'$H$$$&C1
L#$r "I must ship this package immediately." $H$$$&;~$H "I must get aboard the ship immediately."
$H$$$&;~$G6hJL$7$F$$$k!#)

4X?t **length** $O%j%9%H$NCf$NMWAG$N?t$r65$(F/lkbNG"$k!#=>$C$F!" **(length kill-ring)** $O kill
%j%s%0NCfNMWAG$N?t$rJV$9$3HKJk!#

B.1.1 `rotate-yank-pointer` $NK\BN

rotate-yank-pointer $O **let** <0$G$"$j!" **let** $NK\BN$O!" **if** <0G"$k!#

3N **if** <0$O!" kill %j%s%0$K2?$+MWAG$,$"$k$+$I$&$+$r8+$k$?$aNbNG$"$k!#b7 kill %j%s%0$,6u$
error 4X?t$,$3$N4X?t$NI>2A$r;_$a$F!"%(%3!<NN0h$K%a%C%;!<%8$rI=<($9$k!#0lJ}!"$b$7 kill %j%s%0$,6u
$+$C$?>l9g$O!"3N4X?t$N;D$j$N;E;v$,<B9T5l$k!#

0J2<$,!"$3$N **if** <0$N if-part $H then-part G"$k!#

```
(if (zerop length)                     ; if-part
    (error "Kill ring is empty")       ; then-part
  ...
```

b7 kill %j%s%0$K2?$bJ1lP$=$ND9$5$ONmG"k+$i!"%f!<%6$KBP7F 'Kill ring is empty' $H$$$&%(%i
%a%C%;!<%8$,I=<($5lk!#>e$N **if** <0$G$O!"CM$,Nm$+$I$&$+$NH=Dj$K **zerop** $r;H$C$F$$$k!#3l$O%F%9%HB
NmG"lP??rJV94X?tG"$k!#$b$7 **zerop** %F%9%H$,??G"lP!" **if** <0$N then-part $,I>2A$5lk!# the
part $O4X?t **error** $+$i;O$^$k%j%9%HG"$k!#$3$N4X?t$O **message** 4X?t$H;w$F$$$F (Section 1.8.5, "4X?t
message", p. 10, ;2>H)!"0l9T%a%C%;!<%8$r%(%3!<NN0h$KI=<(9kN@$,!"$=l@1GOJ$/$F **error** $,Kd$a
$^$l$F$$$k4X?t$NI>2A$rDd;_9kF/$-$b;}CF$$$k!#:#$N>l9g!"$b$7 kill %j%s%0$ND9$5$,NmG"lP4X?t$N
ItJ,$OI>2A$5lJ$$$H$$$&3HKJ$k!#

(8D?ME*$J0U8+$G$O!">/$J$/$H$b?M4V$KHCFO!"3N4X?t$K 'error' $H$$$&MQ8l$r;H$&NOAgCH8m2
$-$d$9$$5$$,9k!#Nc$($P 'cancel' $H$$$&MQ8l$NJ}$,hj7C$/$j$/$k!#L^O@87L)$K8@$($PD9$5$r;}$?J
%H$NMWAG$r;X$9$3HO=PMh$J$$$7!"$^$7Fd;X$90LCV$r=d2s5;k3HJ$I=PMh$J$$!#$@$+$i!"7W;;5!$N;
FP 'error' $H$$$&8@MU$OA4$/@5$7$$!#7+$7?M4V$NN)>l$+$i9k$H!"$3$&$$$C$?$3Hr7?$$$N$O kill %j%
6u$+$=$&$G$J$$$+$r8+$k>l9g$@$1G"$k!#$3lO0l<o$ND4::$G7+$J$$!#

?M4V$N;kE@$+$i8+$k$H!"D4::$dH/8+$H$$$&9T0Y$OI,$:7b%(%i!<GO$J$$!#=>CF!"Nc$(7W;;5!$N@$3&$N
$$$k>l9gGb%(%i!<$H8F$VY-GO$J$$!#b7$=$&$@$H7?$i!" Emacs $N%3!<%I$O!"@5$7$$BVEY$G<+$i$
$rD4::$7$F$$$k?M$,%(%i!<$rHH7F$$$k$H8@$C$F$$$k3HKJCF7^$&$+i@!#3lGO$^$:$$!#$$$/$
5!$NJ}$,%(%i!<$,5/$-$?>l9g$HF1$8%9%F%C%W$r<hk3HKJkHO$$$CFb!" 'cancel' $NJ}$,hj@5$7$$8
;}CF$$$kHO8@$($h$&!#)

if <0$N else-part

if <0$N else-part $O kill %j%s%0$,6uGJ$$>l9g$N **kill-ring-yank-pointer** $N@_Dj$KHqd5lF$$$k!#
%3!<%I$O0J2<$NDLjG$"$k!#

```
(setq kill-ring-yank-pointer
      (nthcdr (% (+ arg
                    (- length
                       (length kill-ring-yank-pointer)))
                 length)
              kill-ring)))))
```

3lKOAgCH@bL@$,I,MW$@m&!#$^$: **kill-ring-yank-pointer** $, kill %j%s%0$N2?HVL\$+$N CDR $K@_
Dj5lkY$-$G$"$k$H$$$&NO$$$$$@m&!#3lKO0JA0@bL@7? **nthcdr** 4X?t$r;H$&!# (Section 8.5, "cop
region-as-kill", p. 71, ;2>H!#) 7+$7!"<B:]$KOI$&$7$?$i$$$$$N$@$m$&$+!#

:Y$+$$%3!<%I$r8+$kA0$K!"$^$: **rotate-yank-pointer** $NL\E*$r9M$($F$_$h$&!#

rotate-yank-pointer 4X?t$O!" **kill-ring-yank-pointer** $,;X$9>l=j$rJQ99$9$k!#$b$7 **kill-ring-yank-pointer** $,%j%9%H$N:G=i$NMWAG$r;X7F$$$k>uBV$+$i=PH/7?>l9g!" **rotate-yank-pointer** $r8F$S
=P9H!"3l$,FsHVL\$NMWAG$r;X$9$3$HKJ$k!#$=7F99$K **rotate-yank-pointer** $r8F$S=P9H!";0HVL
0\$k!# ($^$?!" **rotate-yank-pointer** $K 1 hjBg$-$J0z?t$rM?$($F8F$S=P9H!"$=$N?t$@$1;X$90LCV$,0\
5l$k!#)

rotate-yank-pointer 4X?t$O **setq** $r;H$C$F **kill-ring-yank-pointer** $,;X$90LCV$r%j%;%C%H$7$F$$ $k!#$b$7 **kill-ring-yank-pointer** $, kill %j%s%0$N:G=i$NMWAG$r;X7F$$$?Ji!"C1=c$J>l9g!" **rotate-yank-pointer** 4X?t$OFsHVL\$NMWAG$r;X$5J1lPJi$J$$!#JL$N8@$$J}r9kH!" **kill-ring-yank-pointer** $O kill %j%s%0$N CDR KEy7$$CM$K:F@_Dj$5lJ1lPJiJ$$$NG"$k!#

B($A!"

```
(setq kill-ring-yank-pointer
   ("some text" "a different piece of text" "yet more text"))

(setq kill-ring
   ("some text" "a different piece of text" "yet more text"))
```

$H$$$&>u67GO!"%3!<%I$O

```
(setq kill-ring-yank-pointer (cdr kill-ring))
```

HJkY$-$G$"$k!#7k2LH7$F!" **kill-ring-yank-pointer** $O<!$Nh&KJCF$$$J1lPJiJ$$!#

```
kill-ring-yank-pointer
     ⇒ ("a different piece of text" "yet more text"))
```

<B:]$N **setq** <0$G$O **nthcdr** 4X?t$,;Hol$F$$$k!#

0JA08+$?$h$&$K (Section 7.3, “nthcdr”, p. 60, ;2>H)!" **nthcdr** 4X?t$O%j%9%H$N CDR $r7+$jJV$7<h$k3H KhCFF0:n9k!#3l$O CDR $N CDR $N ... $N CDR $r<h$k!"$H$$$&3HG"$k!#

<!NFsD$N#S<0$OF1$8$3HG$"$k!#

```
(setq kill-ring-yank-pointer (cdr kill-ring))

(setq kill-ring-yank-pointer (nthcdr 1 kill-ring))
```

7+$7 **rotate-yank-pointer** 4X?tGO!" **nthcdr** $N:G=i$N0z?t$N=j$K2?di;;?t$,;H$olF$$$F!"J#;($ $&$K8+$($k!#

```
(% (+ arg
      (- length
         (length kill-ring-yank-pointer)))
   length)
```

3l$rM}2r$9kK$O!"$$$DbNDLj^$:%M%9%H$N0lHV?<$$=jK"$k#S<0$+$i=g$K8+$F$$$/I,MW$,$"$k!#

bCHb?<$$=jK"$k#S<0$O (**length kill-ring-yank-pointer**) G"$k!#$3lO!"8=:_$N **kill-ring-yank-pointer** $ND9$5$rD4$YkbN@!#(**kill-ring-yank-pointer** OCM,%j%9%HG"kh$&$JJQ ?t$NL>A0$G$"$k3H$r;W$$=P$=$&!#)

3ND9$5$rB,Dj9k#S<0$O!"<!$N#S<0NCfKKd$a9~$^lF$$$k!#

```
(- length (length kill-ring-yank-pointer))
```

3N#S<0NCfN:G=i$N **length** $O!"$3$N4X?t$N:G=i$N **let** <0$N6I=jJQ?t$N@k8@$NItJ,$G kill %j%s%0$ND9$5$ Dj5l$?JQ?t$G$"$k!#(3N **length** $H$$$&JQ?t$O **length-of-kill-ring** $HL>IU$1$?J}$,2rjd$9$$$NG $J$$$+$H$$$&?M$b5o$k$+$b7l$J$$!#7+$7!"$3$3$GdC$F$$$kh&$K>.$5$$ItJ,$K@Z$jJ,1?j;$:$K! BN$rD/$aF_lP!"C;$$$,8N$KLLE]$G$J$$$H$$$&3H$,<B46=PMh$k$@$m$&!#)

=>CF!" (**- length (length kill-ring-yank-pointer)**) $H$$$&9T$G!" kill %j%s%0$ND9$5$H **kill-ring-yank-pointer** $H$$$&L>A0$N%j%9%H$ND9$5$N:9rCNk3H$,=PMh$k!#

3l$, **rotate-yank-pointer** 4X?tNCfKI&AH9~$^$lkF$$$k$+$r8+k?aK!"$^$: **kill-ring-yank-pointer** $, kill %j%s%0$N:G=i$NMWAG$r;X7F$$$k>l9g!"D^$j!" kill %j%s%0A4BN$G$"$k>l9g$K!" **rotate-yank-pointer** $r0z?t 1 $G8F$S=P9HI&Jk$+$rJ,@O7F$_$k3HK7h&!#

3N>l9g$O!"JQ?t **length** $H **(length kill-ring-yank-pointer)** $ND9$5$OF1$8G"$k!#$H$$$&NO!"JQ?t **length** NCMO kill %j%s%0$ND9$5G"$j!" **kill-ring-yank-pointer** $O kill %j%s%0A4BN$r;X7F$$$k$+$iG"$k!#7k2L$H7F!"

```
(- length (length kill-ring-yank-pointer))
```

NCMONmKJ$k!#0z?t$H7F 1 $rM?$($F$$$kNG!"

```
(+ arg (- length (length kill-ring-yank-pointer)))
```

A4BNNCMO 1 KJ$k!#

$=$&9k$H!" **nthcdr** $N0z?t$H7F$O<!$N<0NCM,EO$5$1k3HKJk!#

```
(% 1 length)
```

>jM>4X?t %

(% 1 length) $rM}2r$9kK$O!" **%** $,2?$+rCNiMPJi$J$$!#@bL@J8;zNsKhkH ($3$1$O **C-h f % RE**
$H%?%$%W9k$H8+$k3H$,=PMh$k)!" **%** 4X?t$O:G=i$N0z?t$rFsHVL\$N0z?t$G3d$C$?M>$jrJV94X?tG"k3
$k!#Nc$($P 5 $r 2 $G3d$C$?M>$j$O 1 G"$k!# (2 $O 5 NCfKFs$D4^$^lF$$$F!";Dj, 1 $H$$$&3HG"$k!#

$"$^$j;;?t$rCNiJ$$?MNCfK$O!"$"$k?t$r$=$N?thjbBg-$J?t$G3dk3H,=PMh$F!"$7$+$bM>j^
kHJ9$/$HSC$/$j9k?M$bB?$$!#>eNNcG$O 5 $r 2 $G3d$C$?$N$@$,!"3l$r5U$K7F!" 2 $r 5 $G3d$kH
k@m&$+!#$b$7J,?t$r;H$($l$P!"Ez$($OL@$i$+$K 2/5 b7$/$O 0.4 G"$k!#$,!"$3$3GO@0?t7+;H$($
$G!"$3lH$O0c$&Ez$($KJiJ1lPJi$J$$!#L@i+$K 5 $O 2 NCfKNm8D7+4^$^lF$$$J$$!#$,!";D$j
D@m&!#Ez$($rCNk?aK!";R6!$N:"$+$i?F$7sG$$$k>l9g$r9M$(F_h&!#

- 5 $r 5 $G3d$k$H!">&$O 1 $G!"M>$j$O 0 G"$j!"
- 6 $r 5 $G3d$k$H!">&$O 1 $G!"M>$j$O 1 G"$j!"
- 7 $r 5 $G3d$k$H!">&$O 1 $G!"M>$j$O 2 G"$k!#
- F1MM$K!" 10 $r 5 $G3d$k$H!">&$O 2 $G!"M>$j$O 0 G"$j!"
- 11 $r 5 $G3d$k$H!">&$O 2 $G!"M>$j$O 1 G"$j!"
- 12 $r 5 $G3d$k$H!">&$O 1 $G!"M>$j$O 2 G"$k!#

3l$HA4$/F1$8$h$&$K9M$($l$P!"

- 0 $r 5 $G3d$k$H!"M>$j$O 0 G"$j!"
- 1 $r 5 $G3d$k$H!"M>$j$O 1 G"$j!"
- 2 $r 5 $G3d$k$H!"M>$j$O 2 G"$j!"

$H$$$&6q9gKJ$k!#

=>CF!":#2s$N%3!<%I$G$O!"$b$7 **length** NCM, 5 G"lP!"

```
(% 1 5)
```

$rI>2A$7$?7k2L$O 1 KJ$k!# ($3lO!"%+!<%=%k$r>e$N<0$N:G8e$K;}CF$$$C$F **C-x C-e** $H%?%$%W9l$P3N
il$k!#$Acs$H%(%3!<NN0h$K 1 $,I=<($5lkO:$@!#)

rotate-yank-pointer NCfG$N % $NMxMQ

kill-ring-yank-pointer $, kill %j%s%0$N:G=i$r;X$7F*$j!"$+$D **rotate-yank-pointer** $N0z?t$H7F 1 $,EO$5l?>l9g!" **%** <0$,JV$9CM$O 1 KJ$k!#

```
(- length (length kill-ring-yank-pointer))
     ⇒ 0
```

8N$K!"

```
(+ arg (- length (length kill-ring-yank-pointer)))
     ⇒ 1
```

G"$j!"7k2L$H7F **length** NCMK4X78L5$/

```
(% (+ arg (- length (length kill-ring-yank-pointer)))
   length)
     ⇒ 1
```

HJ$k!#

0J>e$+$i!"3N>l9g$N **setq kill-ring-yank-pointer** <0$O!"

```
(setq kill-ring-yank-pointer (nthcdr 1 kill-ring))
```

Nh$&$KJk!#3l$r8+$l$P!"$dCF$$$k3H$O01L\NFA3$@!# **kill-ring-yank-pointer** $N;X$90LCV$r ki
%j%s%0$N:G=i$NMWAGGOJ/FsHVL\$NMWAG$K%;%C%H$9kNG"$k!#

$^$?!" **rotate-yank-pointer** KEO90z?t$r 2 K9lP **kill-ring-yank-pointer** $O **(nthcdr 2 kill-ring)** $K%;%C%H$5lk3H$bL@$i$+$@m&!#B>$N0z?t$rM?$($?>l9g$bF1MM$G$"$k!#

F1$8$h$&$K!"b7 **killl-ring-yank-pointer** $, kill %j%s%0$NFsHVL\$NMWAG$+$i%9%?!<%H7?>l9g!"$=$N
D9$5 length $O kill %j%s%0$ND9$5$h$j 1 >/$J$$CMKJ$j!"$^$?M>$j$N7W;;$O **(% (+ arg 1) length)** G"$k!#
=>CF!"0z?t 1 $G **rotate-yank-pointer** $rI>2A$9kH!" **kill-ring-yank-pointer** $O kill %j%s%0$NFs
HVL\$NMWAG$+$i;0HVL\$NMWAG$r;X$9h&$KJQ99$5lk!#

:G8e$NMWAG$r;X7F$$$k>l9g

:G8e$NLdBj$O!" **kill-ring-yank-pointer** $, kill %j%s%0$N:G8e$NMWAG$r;X7F$$$?>l9gKI$&$Jk+G
$k!# kill %j%s%0$KOb$&2?$b;DCF$$$J$$$N$G!" **rotate-yank-pointer** $O2?$b;X5J$$>uBVKJkN$@$m
$+!#Ez$($O No G"$k!#<B:]$KObCHET9g$NNI$$7k2LKJ$k!# **kill-ring-yank-pointer** $O kill %j%s%0$N
:G=i$NMWAG$r;X9h$&$K%;%C%H5lkNG"$k!#

%3!<%I$r8+$FINh&$KF0:n$9kN$+$r8+F_k3HK7h$&!#<h$j4:$($: kill %j%s%0$ND9$5$O 5 $H
rotate-yank-pointer KEO90z?t$O 1 G"kH9k!# **kill-ring-yank-pointer** $, kill %j%s%0$N:G
8e$NMWAG$r;X7F$$$k>l9g!"$=$ND9$5$O 1 G"$k!#%3!<%I$O<!Nh$&$KJC$F$$$k!#

```
(% (+ arg (- length (length kill-ring-yank-pointer))) length)
```

>e$N<0$NCf$NJQ?t$r<B:]$N?tCM$GCV-49(kH!"<0$O<!$Nh&KJ$k!#

```
(% (+ 1 (- 5 1)) 5)
```

3N#S<0rbCH$bFbIt$N<0$+$i30B&$K8~$+CF8+$F$$$3$&!# **(- 5 1)** NCMO 4 G"$k!# **(+ 1 4)** $H$$$&OB
KJ$k!#$=7F!" 5 $r 5 $G3d$C$?M>$j$O 0 G"$k!#=>CF **rotate-yank-pointer** GO!"

```
(setq kill-ring-yank-pointer (nthcdr 0 kill-ring))
```

$H$$$&#S<0$rI>2A$9k3HKJk!#3l$O!" **kill-ring-yank-pointer** $r kill %j%s%0$N:G=i$NMWAG$r;X9
$&$K%;%C%H9kbNG"$k!#

=>CF!" **rotate-yank-pointer** $rB3$1$F8F$S=P9H!" **kill-ring-yank-pointer** $r kill %j%s%0$N:G=i
NCM+$i=g$K0\F0$7$F$$$-!":G8e$NMWAG$^GMh?i^$?:G=i$KLakH$$$&U&KJ$k!#$=7F3l3=$, k
%0$,%j%s%0$H8FPl$k=j0J$G$"$k!#:G8e$^$GMh$?$i$^$?:G=iKLakNG!"$"$?$+$b%j%9%HKO=*oj$,$J$
8+$($kN@!* (LuCp!'86J8GO:G8e$K "And what is a ring, but an entity with no end?" $H$$$&J8$,B3$/!#
3lOI$&Lu$7$?$bN@m&!))

B.2 yank

rotate-yank-pointer KD$$$F3Xs@8eGO!" **yank** 4X?t$N%3!<%I$OA4$/0W$7$/8+$(k@m&!#3lK
0l2U=j$@$1%H%j%C%-!<$JItJ,$,$"$k!# **rotate-yank-pointer** KEO90z?t$N7W;;$N=j$@!#

%3!<%I$O0J2<$NDLjG$"$k!#

```
(defun yank (&optional arg)
  "Reinsert the last stretch of killed text.
More precisely, reinsert the stretch of killed text most
recently killed OR yanked.
With just C-u as argument, same but put point in front
(and mark at end).  With argument n, reinsert the nth
most recently killed stretch of killed text.
See also the command \\[yank-pop]."

  (interactive "*P")
  (rotate-yank-pointer (if (listp arg) 0
                         (if (eq arg '-) -1
                           (1- arg))))
  (push-mark (point))
  (insert (car kill-ring-yank-pointer))
  (if (consp arg)
      (exchange-point-and-mark)))
```

3N%3!<%IA4BN$rD/$aF_kH!":G8e$N?t9T$@1Gb[$\==J,$J3H$,J,$k!#$^$:%^!<%/$,%W%C%7%e$5$l
$^$j!"0LCV$,5-21$5lk!#$=$7$F!" **kill-ring-yank-pointer** $,;X$9%j%9%H$N:G=i$NMWAG (B($A CAR) $,A^F
5l$k!#99$K!"b74X?tKEO5l?0z?t$,%3%s%9%;%k$G$"$l$P!"%]%$%s%H$H%^!<%/$,8r49$5$l!"%]%$%s%H$
l?%F%-%9%H$N:G8e$GOJ$/:G=i$N0LCVKCV+lk!#3N%*%W%7%g%s$O@bL@J8;zNs$NCf$G@bL@$5lF$$$k!
NbNO%*%W%7%g%s "***P**" $G%$%s%?%i%/%F%#%V@k8@5l$F$$$k!#3l$O!"=q$-9~$_IT2D$N%P%C%U%!GOF0:n
L$=hM}$NA0CV0z?t$,4X?t$KEO5lkH$$$&;XDjG"$k!#

0z?tNEO7J}

yank GFq7$$$N$O **rotate-yank-pointer** KEO5lk0z?t$N7W;;$rM}2r9kItJ,G"$k!#9,$$$J3H$K!
3l$O8+$?L\DxFq$7$$$o1GOJ$$!#

dC$F$$$k3H$O!"Fs$D$"$k **if** <0$NJRJ}$J$$$7$ON>J}$rI>2A$7!"7k2L$H7FF@il$??tCM$r **rotate-yank-pointer** $K0z?t$H7FEO9H$$$&3HG"$k!#

%3!<%I$r%3%a%s%HIU$-$G8+$d$9$$$h$&$K=q$/$H!"<!Nh$&$KJk!#

```
(if (listp arg)                         ; if-part
    0                                   ; then-part
  (if (eq arg '-)                       ; else-part, FbIt$N if
      -1                                ; FbIt$N if $N then-part
    (1- arg))))                         ; FbIt$N if $N else-part
```

3N%3!<%IOFsD$N **if** <0$+iJ$k!#0l$DOb$&0lJ}$N else-part KJCF$$$k!#

:G=i$N30B&$N **if** <0$O **yank** KEO5l?0z?t$,%j%9%HG"k+I&$+$N%F%9%HG"$k!#4qL/J3HK!" y
$,0z?tL5$7$G8F$S=P5l$?>l9g$KO3lO??KJ$k!#M}M3$O!"3N>l9g>JN,2DG=$J0z?t$NCMH7$F **nil** $
lkN@$,!" **(listp nil)** $O??$KJk$+$iG"$k!*=>$C$F!"$b$7 **yank** $r0z?tL5$7$G8F$S=P9H **yank** $N
It$N **rotate-yank-pointer** KO0z?tH7FNm,EO5l$k!#$3lO!" **kill-ring-yank-pointer** $,;X$9%j
%9%H$OJQ2=$;$:!"$=$N:G=i$NMWAG$,A^F~$5lk3H$r0UL#$9$k!#$3lO!"4|BTDLjNF0:nG"$k!#F1MM$K
yank $,0z?t **C-u** $G8F$S=P5l$?$H9k$H!"$3lb%j%9%H$@$H8+Jo5l!"$^$?bd **rotate-yank-pointer**

KONm$,EO$5lk!# (C-u$O=hM}$5lJ$$A0CV0z?t (4) $r@8@.$9k?$a!#) F1;~$K!"3N0z?tO3$N4X?t
$NItJ,$G%3%s%9%;%k$H8+Jo$5lkNG!"%]%$%s%H$OA^F~5l$?%F%-%9%H$N;OaK!"%^!<%/$O=*$ojKCV$+
(interactive $N P $H$$$&0z?t$O!"%*%W%7%g%s$N0z?t$,EO$5lJ$+$C$?>l9g$d C-u $,EO$5l?>l9g$K>e$O
Y?h&JCMrM?$($kh&$K@_7W$5lF$$$k!#)

$H$$$&3H$G!"0z?tL5$7$N>l9g$d0z?t$, C-u $N>l9g$O!"30B&$N if <0$N then-part $,07$&!#$=$7$F!"$=$NE
>l9g$O else-part $,07$&!# else-part O=$l<+?H$, if <0KJCF$$$k!#

FbIt$N if <0$O!"0z?t$,Ii$NId9f$+$I$&$+$rH=Dj$9$k%F%9%H$G$"$k!# (3l$O META %-!<$H - %-!<$rF1;~$K
$+!" ESC %-!<$r2!7F$+$i - %-!<$r2!$9$HH/@8$9$k!#) 3N>l9g!" rotate-yank-pointer 4X?tKEO5lk0
?t$O -1 KJ$k!#$3lO!" kill-ring-yank-pointer $N;X$90LCV$r0l$D<jA0KLa9$3$HKJ$j!"4|BTDL$j$NE
:nHJ$k!#

b7FbIt$N if <0$N??56%F%9%H$,56$G$"$C$?$J$i ($D$^$j0z?t$,Ii$NId9fGJ1l$P)!"$3$N#S<0$N else-
$,I>2A$5lk!#3l$O!" (1- arg) $H$$$&<0G"$k!#Fs$D$N if <0$+$i!"$3$N>l9g$KJkNO0z?t$,@5$N?t
k+!"b7$/$O (C1KIiNId9f$@$1GO$J$$) Ii$N?t$G$"$k>l9gN_G"$k!# (1- arg) O=$N?t$+$i 1 $r0z
CMrJV9!# (1- $O0z?t$r 1 8:i94X?tG"$k!#) 3l$O!"b7 rotate-yank-pointer $N0z?t$, 1 $@$C$?$H$
kH!"$=$l$, 0 KJkH$$$&3HG"$k!#=>$C$F!" kill-rotate-yank-pointer $N:G=i$NMWAG$,%d%s%/$5$
$k!#$3lb4|BTDLjG$"$k!#

Ii$N0z?t$rEO9HI&Jk$+

:G8e$K!"4v$D$+$N5?Ld$,M/$/!#b7!V>jM>4X?t!W % $d nthcdr4X?t$KIi$N0z?t$rM?$($?H9kHI&Jk
$&$+!#

Ez$($OAgCH<B83$7$F$_$l$PJ,$k!# (% -1 5) $rI>2A$9kH!"Ii$N0z?t$,JV$k!#$^$?!" nthcdr $,Ii$N0
$H6&$K8F$S=P$5lk$H!":G=i$N0z?t$,Nm$G$"$C$?>l9g$HF1$8CM$,JV$k!#$3lO<!$N%3!<%I$rI>2A9l$P3N$
$k!#

0J2<GO!"⇒' $N8e$K=q$+$l$F$$$kbN$,$=$NA0$N%3!<%I$rI>2A$7$?7k2L$G$"$k!#I>2A9kKO!"$$$D$b
$&$K%3!<%I$ND>8e$K%+!<%=%k$rCV$$$F C-x C-e (eval-last-sexp) $H%?%$%W9k$HNI$$!#3l$O!"$3$NJ8=q
GNU Emacs $N Info NCfGFIsG$$$k>l9gKO$=$N$^$^<B9T=PMh$k!#

```
(% -1 5)
     ⇒ -1

(setq animals '(cats dogs elephants))
     ⇒ (cats dogs elephants)

(nthcdr 1 animals)
     ⇒ (dogs elephants)

(nthcdr 0 animals)
     ⇒ (cats dogs elephants)

(nthcdr -1 animals)
     ⇒ (cats dogs elephants)
```

=>CF!"Ii$NId9f$dIi$N?t$, yank KEO5l?>l9gKO!" kill-rotate-yank-pointer $O5U8~$-$K<~$j!"
%j%9%H$N:G=i$KC)jD$/$H!"$=$N$^$^;_$^$k$H$$$&7k2LKJ$k!#@5$N0z?t$rM?$($?>l9g$Nh&$K!"0lHV:G8
$/$H$^$?:G=iKLak$H$$$&U&KOJi$:!"$=3G;_$^$CF7$^$&o1G"$k!#$3lO9gM}E*$JF0:n$G$"$
%/9k:]$O!"D>A0$K@Z$j<h$C$?%F%-%9%H$r%d%s%/7?$$>l9g$,:G$bB?$/!"IaDL$O 30 2s$bA0$K kill 7?%F%-%
A^F~7h$&$H$O;W$o$J$$$$@m&!#$@$+$i!"%j%s%0$NCf$r=g$K?JsG$$$C$F0lHV:G8e$^$G9T$/3HO"CF$
$i:G=i$NJ}KLam$&$H7F!"$^$?0lHV:G8eKLaCF7$^$&JsF3HO!"$"$C$FM_$7$/$J$$$K0c$$$J$$!#

$D$$$G$K$$$CF*$/$H!"Ii$NId9f$,$D$$$??t$, yank $K0z?t$H7FEO5l$k>l9g$O!"A4$F −1 H7$F07o
3l$O!"L@$i$+$K%W%m%0%i%`$rC1=c$K9k$?$aNbNG$"$k!# kill %j%s%0NCfr:G=i$NJ}$K8~$+$C$F0lEY$K
>e$b%8%c%s%W$9kI,MWO$J$$$7!"Ii$N?t$N@dBPCM$r7hDj$9$k4X?t$r=q$/$hjb3CANJ}$,$:CH4JC1G"

B.3 yank-pop

yank $rM}2r$7F7$^$($P!" **yank-pop** 4X?t$O4JC1$KM}2r=PMh$k!#%9%Z!<%9$N@aLs$N$?$a$K@bL@J8;zNs$r> $H!"%3!<%I$O<!NDLjG"$k!#

```
(defun yank-pop (arg)
  (interactive "*p")
  (if (not (eq last-command 'yank))
      (error "Previous command was not a yank"))
  (setq this-command 'yank)
  (let ((before (< (point) (mark))))
    (delete-region (point) (mark))
    (rotate-yank-pointer arg)
    (set-mark (point))
    (insert (car kill-ring-yank-pointer))
    (if before (exchange-point-and-mark))))
```

3N4X?t$O!">.J8;z$N 'p' $G%$%s%?%i%/%F%#%V@k8@5l$F$$$k!#=>CF!"A0CV0z?t$O=hM}$5lF$+$i4X?t lk!#3N%3%^%s%I$O!"D>A0$K%d%s%/$r9T$C$?>l9g$KN_M-8zG"$k!#$=$&$GJ1lP!"%(%i!<%a%C%;!<% lk!#3N%A%'%C%/$OJQ?t **last-command** $G9T$&!# (3lKD$$$F$OB>$N=j$G@bL@$7$?!# Section 8.5, "copy region-as-kill", p. 71, ;2>H!#)

let <0GO!"JQ?t **before** $r!"%]%$%s%H$,%^!<%/$NA0K"k+8eK"k+KhCF??b7$/$O56$K%;%C $k!#$=7F!"%]%$%s%H$H%^!<%/$N4V$N%j!<%8%g%s$r:o=|$9$k!#$3lO!"D>A0$N%d%s%/$KhC$FA^F~$5l?% %sG"$j!"CV$-49$($h$&$H7F$$$kItJ,G"$k!#<!$K **kill-ring-yank-pointer** $r2s$7$FD>A0$KA^F~7? %-%9%H$,$^$?A^F~$5lJ$$$h$&$K9k!#%^!<%/$O?7$7$$%F%-%9%H$,A^F~$5lkY-ItJ,$K%;%C%H$5$l!" **ring-yank-pointer** $,;X$9%j%9%H$NMWAG$,A^F~5l$k!#$=$N7k2L!"%]%$%s%H$O?7$7$/A^F~$5l?%F%-%9% D>8eKCV+lk!#$3$3$G!"$b$7A02s$N%d%s%/$G%]%$%s%H$,A^F~$5l?%F%-%9%H$NA0$KCV$+$l$F$$$?Ji%]% %^!<%/$r8r49$7$F!"%]%$%s%H$r:#2sA^F~$7$?%F%-%9%H$N:G=i$N0LCV$K0\F0$9$k!#3l$,$3$N4X?t$GdCF $NA4$FG"$k!*

Appendix C %i%Y%k$H<4$,IU$$$?%0%i%U

:BI8<4rIA/$H!"%0%i%U$rM}2r9k<j=u1KJk!#L\@9bD1?$$!#0JA0$N>O$G$O (Chapter 15, "%0%i%U $/=`Hw", p. 133, ;2>H) %0%i%U$NK\BN$rIA$/%3!<%I$r=q$$$?NG$"$C$?!#$3$3$GO=$NK\BN$K$=$C$F=D<4$H2 I=<($7!"%i%Y%k$rD1$k%3!<%I$r=q$/$3HK7h$&!#

$3$3GNA^F~$O!"%P%C%U%!$N%]%$%s%H$N2<J}$r1&J}8~$K8~CFKdaF$$$/NG!"?7$7$$%0%i%UI=<(4X?t$ $: Y <4$J$$$7$O=D<4$rI=<($7!"$D$$$GK\BN$r!"$=7F:G8e$K X <4$J$$$7$O2#<4$rI=<(9k$H$$$&=gHVKJ $NN.$l$+$i!"4X?t$NCf?H$N%l%$%"%&%H$O<!Nh$&$J46$8$KJk!#

1. %3!<%I$N2<=`Hw!#
2. Y <4$NI=<(!#
3. %0%i%UK\BN$NI=<(!#
4. X <4$NI=<(!#

0J2<$K=PMh>e$,C?%0%i%UNNc,I&$"$kY-$+$r:\$;F*$/!#

```
        10 -
                      *
                      *  *
                      *  **
                      *  ***
         5 -      *   *******
                * *** *******
                *************
              ***************
         1 - ****************
             |   |    |    |
             1   5   10   15
```

3N%0%i%UGO!"=D<4$H2#<4$K$O?t$Khk%i%Y%k$,$D$$$F$$$k!#7+7J$,$i!"%0%i%U$N<oN`$KhCFO2 4V$G!"7n$Khk%i%Y%krD1?J}$,NI$$>l9g$bB?$$$@m&!#<!Nh$&$J46$8$@!#

```
         5 -      *
                * ** *
                *******
              ********** **
         1 - **************
             |    ^      |
             Jan  June   Jan
```

<B:]KO!"AgCH9M$($l$P2#<4$d=D<4KD$$$FMM!9$J7A<0$r;W$$$D$/!#J#;($J4X?tK9k3Hb2DG=$($7J#;(5O:.Mp$r>7$/!#$=lhjb!":G=i$OC1=c$J7A<0$rA*sG!"8eG=lr=$@5$J$$$7OCV-49$($kN m&!#

0J>eN3Hr9MN8$9$k$H!"<!$Nh&$J%"%&%H%i%$%s$G print-graph 4X?t$r=q$$$F$$$/N,$$$$$@m&!#

```
(defun print-graph (numbers-list)
  "documentation..."
  (let ((height  ...
         ...))
    (print-Y-axis height ... )
    (graph-body-print numbers-list)
    (print-X-axis ... )))
```

3N print-graph 4X?t$N?w7?$r85K7$F!"3F!9$NItJ,$r=g$K=q$$$F$$$/3HK7h&!#

C.1 print-graph $NJQ?t%j%9%H

print-graph 4X?t$r=q$/:]K^$:$diMPJiJ$$$3HO!" **let**<0$NJQ?t%j%9%H$r=q$/$3HG$"$k!# (<h$ $($:!"%$%s%?%i%/%F%#%V<0$d@bL@J8;zNsN3HOCV$$$F$*$/!#)

JQ?t%j%9%HGO4vD+NCMr@_Dj7J1lPJiJ$$!#=D<4$N%i%Y%k$N0lHV>e$O>/$J$/$H$b%0%i%U$N9b$5 FO$$$1$J$$$N$G!"$^$:$3lK$D$$$F$N>pJs$,I,MWKJ$k!# **print-graph-body** 4X?tGb3N>pJs$,I,MW$ $?$3Hr;W$$=P$=$&!#F1$87W;;$rJL$N>l=j$GFsEY9T$&M}M3$OI3Kb$J$$$N$G!"0JA0Dj5A$7$? **print-graph-body** $r=q49$(F3$N7W;;$r0lEY$@$1K9kY$-$G$"$k!#

F1MM$K!" X <4$N%i%Y%k$rI=<($9$k4X?t$H **print-graph-body** 4X?tNIAiK*$$$F$b5-9f$NI}NCMrCN$ MW$,$"$k!#$3lb0JA0$N>O$N **print-graph-body** $NDj5A$r=q49$($F!":G=i$K7W;;$r9^$;$F7^$&$Y$-$G$ $&!#

2#<4$N%i%Y%k$ND9$5$O>/J/Hb%0%i%U$ND9$5$NJ,$OJ1lPJi$J$$!#7+$7!"$3$N>pJs$O2#<4$rI=< ?t$@1KI,MWJbNG$"$k!#=>CF!"$3$3GdiJ$/$H$bNI$$!#

0J>eN3H+$i!" **print-graph** $N **let** <0$NJQ?t%j%9%H$O<!$Nh&$J46$8KJ$k!#

```
(let ((height (apply 'max numbers-list)) ; :G=i$N%P!<%8%g%s
      (symbol-width (length graph-blank)))
```

$,!"8e$G8+kh$&$K!"3lGOAgCH$^$:$$!#

C.2 4X?t print-Y-axis

print-Y-axis 4X?t$N;E;v$O!"=D<4H7$F<!$Nh&$J%i%Y%k$rI=<(9k3HG"$k!#

```
    10 -




     5 -




     1 -
```

3N4X?tKO!"%0%i%U$N9b$5rEO7FdkI,MW,$"$k!#$=$l$r85$KE,@Z$JL\@9$H?t$r9=@.$7!"A^F~9k$ $k!#

?^$G8+$k$H!" Y <4$N%i%Y%k$,$I$&$Jk+Y-$+0lL\NFA3$G$"$k!#7+$7!"$3lr8@MU$GI=$7$=$N;E;v$r ?t$r=q$/$HJk$H!"$AgCHdd3$7$/Jk!#C1$K 5 9T$4HK?t$dL\@9$rD1lP$h$$$H$$$&NO4V0c$$$ '1' $H '5' $N4V$K$O;09T$7$+$J$$ (2!" 3!" 4 9T)!#7+$7!" '5' $H '10'$N4VKO;M9T$"$k (6!" 7!" 8!" 9 9T)!#$^ $O0l9TL\$K%Y!<%9HJ$k9T$H7F?t 1 $HL\@9$r$D$1!"$=$NB>$K:G2<9T$+$i 5 9T$4HKL\@9$H?t$rD1$F$$$/ $?J}$,$h$$$@m&!#

<!$NLdBj$O!"%i%Y%k$N9b$5rI$&$9k+G"$k!#Nc$($P!"%0%i%U$N=DNNsNCf$G:G$b9b$$$bNN9b5, 7 H7h&!#3N>l9g!":G$b>e$N%i%Y%k$O '5-' K7$F!"%0%i%U$r>eKFM-=P5;kY$-$@m&$+!#$=lH$b $N:GBg$N 5 $NG\?t$H7F '10 -' $N=j$^$G%i%Y%k$rIU1kY-$@$m$&$+!#

3l$O8e<T$NJ}$,$h$$$@m&!#BgDq$N%0%i%U$OD9J}7ANJ$+$KIA$+$lF*$j!"B&LL$O9o$_I}$N@0?tG\$K $$$k!#:#$N>l9g$J$i!" 5!" 10!" 15 $H$$$&U&$J 5 $NG\?t$G$"$k!#7+$7!"=D<4$N;EMMH7F3Nh$&$J$:NMQ9kHJkH!"0JA0$N4X?t$NJQ?t%j%9%HGN!"C1=c$K9b5r7W;;9k#S<0$GO^$:$$$3HK5IU/!# **(apply 'max numbers-list)** $H$$$&bN$@$C$?$,!"3lGOC1$K@53N$J%0%i%U$N=D$NNs$N9b$5$N:GBgCM$,= k@1G!" 5 $NG\?t$KJkh&$JD4@0$O7FO/lJ$$!#bC$HJ#;($J4X?t$,I,MW$Jo1G"$k!#

$$$DbN3H$@$,!"J#;($JLdBj$b4vD+$N>.$5$JLdBj$KJ,3d7F9M$($l$PC1=c$JLdBjKJk3H,B?$$!#

:G=i$K!"$$$D%0%i%U$N9b$5$, 5 $N@0?tG\$KJk$+$r9M$($F$_$h$&!#$3lO 5!" 10!" 15 Ey$N 5 $NG\?t$N;~
$k!#$3$N>l9g$O!"3NCM$rB(Y <4$N9b5H7F$h$$!#

$"$k?t$, 5 $NG\?t$KJk$+$I$&$+$r8+$kKO!"3N?t$r 5 $G3d$CF_$F!"M>$j$,$I$&$Jk+$r8+$kN,A
b7M>j,L5$1$l$P!"$=$N?t$O 5 $NG\?t$G$"$k!# 7 $N>l9g$OM>j, 2 KJkN$G!"$3lO 5 $NG\?t$GO
AgCH8@$$$J}rJQ($F>.3X9;$U$&$K@bL@9kJi!" 5 $O 7 NCfK0l2s$@$14^$^lF!";DjO 2 KJ$k!#0l
$O 10 NCfK$O 2 2s4^$^$l!";D$jOJ$$!#=>CF!" 10 $O 5 $NG\?t$H$$$&3HKJ$k!#

C.2.1 4s$jF;: >jM>$N7W;;

Lisp GOM>jr7W;;9k4X?t$O % G"$k!#3N4X?t$O:G=i$N0z?t$rFsHVL\$N0z?t$G3d$C$?;~$NM>$j
$9!#$"$$$K$/!"% $H$$$& Emacs Lisp 4X?t$O **apropos** GO8+D1il$J$$!#D^$j!" **M-x apropos RET remainder RET** H9kH!"2?$b8+$D1ilJ$$!# % $H$$$&4X?t$NB8:_$rCNk?aKO3$NJ8=q$JINK\$r8
$+!" Emacs Lisp $N%=!<%9$rD/ak7+J}K!$,$J$$!# % 4X?t$O **rotate-yank-pointer** NCfG;HolF*$j!"
3l$O<!$N=j$G@bL@$5lF$$$k!# (Section B.1.1, "**rotate-yank-pointer** $NK\BN", p. 166, $r;2>H!#)

% 4X?t$r;n$7F_kK$O!"<!$NFsDN#S<0$rI>2A$7F_kHNI$$!#

```
(% 7 5)

(% 10 5)
```

:G=i$N#S<0$O 2 rJV9$7!"FsHVL\$N#S<0$O 0 rJV9!#

JV5l$?CM$, 0 $+$=$&$G$J$$$+$N%F%9%H$K$O **zerop** 4X?t$,;H$($k!#3N4X?t$O0z?t$H7F?tCM$r<h$j!"$
NmJi **t** rJV9!#

```
(zerop (% 7 5))
     ⇒ nil

(zerop (% 10 5))
     ⇒ t
```

$H$$$&o1$G!"<!$Nh&$J#S<0$r=q1P!"9b5, 5 $G3d@Z$l$k>l9g$K$O **t**$,JV5l$k!#

```
(zerop (% height 5))
```

(**height** NCMOL^O@ **(apply 'max numbers-list)**. $GJ,$k!#)

0lJ}!"b7 **height** $, 5 $NG\?t$G$J$$>l9g!"CM$, 5 $NG\?t$KJkh&$K:F@_Dj$9kI,MW,$"$k!#3l$O4{
Fk@w$_$N4X?t$r;H$($PC1=c$J;;?tK9$.$J$$!#$^$:$O **height** $r 5 $G3d$CF3NCfK2?2s 5 $,4^$^lk$+$r
$k!#Nc$($P 12 Ji 2 2s4^$^lk!#$3NCMK 1 2C$($F 5 G\$9lP!"K@%0%i%U$N:GBg$N9b5hjbBg$-$$:G=i$
G\?t$,F@$ilk!# 5 $O 12 NCfK$O 2 2s4^$^lkNG!"3l$K 1 $rB-$7$F 5 G\$9kH 15 $,5a$^$k!#$3l, 1
1[$($k:G=i$N 5 $NG\?t$G$"!#$3$N:n6H$r9T$&#S<0$O<!NDLjG"$k!#

```
(* (1+ (/ height 5)) 5)
```

Nc$($Pb7<!$N#S<0$rI>2A7?Ji!"7k2L$O 15 KJ$k!#

```
(* (1+ (/ 12 5)) 5)
```

3l$^$G$N5DO@$G$O!V5!W$r Y <4KD$$$F$NL\@9I}$H7F$-$?o1$@$,!"$3$3$OB>$NCM$r;H$CFb9=oJ
HL@-N?aK!" 5 $rB>$NCM$b@_Dj=PMh$kh&$KJQ?t$GCV-49(h&!#;dH7FO!"3NJQ?t$O **Y-axis-lab
spacing** $HL>IU$1kN$,NI$$$H;W$&!#$3$NJQ?t$H **if** <0$r;H$&$H!"<!$N#S<0$,=PMh$k!#

```
(if (zerop (% height Y-axis-label-spacing))
    height
  ;; else
  (* (1+ (/ height Y-axis-label-spacing))
     Y-axis-label-spacing))
```

3N#S<0$O!"$b$7 **height** $, **Y-axis-label-spacing** NCMNG\?tJi **height** NCM=NbNrJV$7!"$=$&$G
$J$$>l9g$O!"$=lhjBg-$$:G>.$N **Y-axis-label-spacing** $NG\?t$NCM$r7W;;$7$FJV$9!#

$=$lGO!"3N#S<0$r **print-graph** 4X?t$NCf$N **let** <0$NCf$K (**Y-axis-label-spacing** $N@_Dj$N8e$G)
Kd$a9~$sG_h&!#

```
(defvar Y-axis-label-spacing 5
  "Number of lines from one Y axis label to next.")

...
(let* ((height (apply 'max numbers-list))
       (height-of-top-line
        (if (zerop (% height Y-axis-label-spacing))
            height
          ;; else
          (* (1+ (/ height Y-axis-label-spacing))
             Y-axis-label-spacing)))
       (symbol-width (length graph-blank))))
...
```

(**let*** 4X?t$r;H$C$F$$$k3H$KCm0U!#;O$a$KJQ?t height $N=i4|CM$, (**apply 'max numbers-list**) <0$G7W
;;5l!"$=$NCM$r;H$C$FB>$NJQ?tNCMr7W;;7F$$$k$?$aG"$k!# **let*** KD$$$F$N>\:Y$O!"<!$r;2>H!# '
<0", p. 100.)

C.2.2 Y <4$NMWAG$N9=@.

=D<4$rI=<($9$k:]$K$O!"'5 -' H+ '10 -' Ey$r 5 9T$4HKA^F~7?$$!#99$K!"?t$O2<$NItJ,$rB7$($?$$!#
$j!">.$5$J7e$N?t$O!"A0$K6uGrrCV/3HKJ$k!#$b$7Fs7e$N?t$,=P$F$-$?;~KO!"0l7e$N?t$N@hF,KO0
GrrCV/3HKJko1G$"$k!#

?t$ND9$5$r5a$akK$O!" **length** 4X?t$,;Hol$k!#$7$+$7!" **length** 4X?t$OJ8;zNs$KBP7F7+$&$^$/F0
$:!"?tCM$O07$($J$$!#$=$3G^$:!"?t$r?tCM$+$iJ8;zNs$KJQ49$9kI,MW,$"$k!#3l$O!" **int-to-string**
$r;H$C$F9T$&3H$,=PMh$k!#Nc$($P!"<!Nh$&$J46$8$G$"$k!#

```
(length (int-to-string 35))
     ⇒ 2

(length (int-to-string 100))
     ⇒ 3
```

99$K!"3F%i%Y%k$K$*$$$F!"3F!9$N?t$K$O ' - ' Nh$&$JJ8;zNsrIU12C$($?$$!#3l$r!" **Y-axis-tic** %^!
$H8F$V3HK7h&!#3NJQ?t$O!" **defvar** $r;H$C$FDj5A$9$k!#

```
(defvar Y-axis-tic " - "
   "String that follows number in a Y axis label.")
```

Y %i%Y%k$ND9$5$O!" Y axis tick mark $H%0%i%U$N0lHV>e$N?t$N7e?tNOBKJk!#

```
(length (concat (int-to-string height) Y-axis-tic)))
```

3NCM$O!" **print-graph** 4X?t$NCf$NJQ?t%j%9%H$N=j$G!" **full-Y-label-width** NCMH7F7W;;5l$k!#
(2f!9$,:G=i$K3N4X?t$r9M$($?;~$K$O!"$3$N4X?t$OJQ?t%j%9%HNCfKF~lk3H$O9M$($F$$$J$+$C$?$3$H
7h$&!#)

=D<4$r40@.$5$;$kKO!"L\@95-9f$r?t$H7k9g9kI,MW$,$"$k!#$=7F!"$=$NA0KO?t$N7e?t$KhC$F6u
$$$?j9$k!#$H$$$&o1$G!"%i%Y%k$K$O;0$D$N%Q!<%H$,$"$k3HKJ$k!#@hF,$N6uGr (L5$$>l9gb"$k)!"
7FL\@95-9fG"$k!#$3$N4X?t$K$O!";XDj$5l?9TKBP9$k?t$NCM$H0lHV>e$N9T$NI}$,EO5l$k!#$3li
print-graph KhCF (0l2s$@$1) 7W;;5l$k!#

```
(defun Y-axis-element (number full-Y-label-width)
  "Construct a NUMBERed label element.
A numbered element looks like this `  5 - ',
and is padded as needed so all line up with
the element for the largest number."
  (let* ((leading-spaces
         (- full-Y-label-width
            (length
             (concat (int-to-string number)
                     Y-axis-tic)))))
    (concat
     (make-string leading-spaces ? )
     (int-to-string number)
     Y-axis-tic)))
```

`Y-axis-element` 4X?t$O!"($b7"lP) @hF,$N6uGr$H!"J8;zNsH7FN?t$H!"L\@95-9f$r7k9g9kbN$
$k!#

@hF,$K$$$/$D6uGr$rD1lP$h$$$+$O!"%i%Y%k$N<B<AItJ,$ND9$5 — ?t$ND9$5$HL\@95-9f$ND9$5$NOB — $
lk%i%Y%k$ND9$5$+$i0z$/$3HG5aailk!#

6uGr$O `make-string` 4X?t$r;HCFA^F~5l$k!#$3$N4X?t$O!"FsDN0z?t$r<h$k!#0lDOJ8;zNs$ND9$5!"
0lDOFCDj$N7A<0$G=q$+$l$?A^F~$9$kJ8;z$N%7%s%\%kG"$k!#:#$N>l9g!"3N7A<0$O `?` Nh$&$K!"5?LdI
6uGr$H$$$&7Ar7$F$$$k!#3Nh&$JJ8;z$NI=$7J}$K$D$$$F$N@bL@$O!"<!$r;2>H!# Section "Character Typ
in *The GNU Emacs Lisp Reference Manual.*

`int-to-string` 4X?t$O!"7k9g<0$NCf$G?t$rJ8;zNs$KJQ49$9k?aK;Hol$F$$$k!#J8;zNs$KJQ49$7F+$
F,$N6uGr$HL\@95-9f$H7k9g$9kNG"$k!#

C.2.3 Y <4A4BN$N9=@.

A0@a$^$G$N4X?t$G!"=D<4$N%i%Y%k$H7FA^F~9kHV9f$H6uGr$N$D$$$?J8;zNs$N%j%9%H$r@8@.9k4X?t$r9=
NKI,MW$J%D!<%k$,A4$FB7$&!#

```
(defun Y-axis-column (height width-of-label)
  "Construct list of Y axis labels and blank strings.
For HEIGHT of line above base and WIDTH-OF-LABEL."
  (let (Y-axis)
    (while (> height 1)
      (if (zerop (% height Y-axis-label-spacing))
          ;; %i%Y%kA^F~
          (setq Y-axis
                (cons
                 (Y-axis-element height width-of-label)
                 Y-axis))
        ;; $=$&$G$J$1$l$P6uGrA^F~
        (setq Y-axis
              (cons
               (make-string width-of-label ? )
               Y-axis)))
      (setq height (1- height)))
    ;; %Y!<%9%i%$%sA^F~
    (setq Y-axis
          (cons (Y-axis-element 1 width-of-label) Y-axis))
    (nreverse Y-axis)))
```

3N4X?tGO!"$^$: **height** NCM+$i=PH/$7F=NCMr0lD:$D8:$i7F$$$-!"3F!9$N0z$-;;$,=*$o$C
G=NCM, **Y-axis-label-spacing**$N@0?tG\$KJC$F$$$k$+$I$&$+$rH=Dj$9$k!#$=7F!"b7$=$&JC$F$$
$P!" **Y-axis-element** 4X?t$r;H$C$FHV9fIU$-$N%i%Y%k$r:n@.$7!"$=$&$GJ1lP **make-string** 4X?t$r;H$C$
6uGr$N%i%Y%k$r:n@.9k!#:G2<9T$O!"HV9f 1 $HL\@95-9f$+iJCF$$$k!#

C.2.4 print-Y-axis :G=*HG

(LuCp!'BjL>$K:G=*HG$H=q$$$F$"$k$,!"<B:]$K$O Section C.4, "%0%i%UA4BN$NI=<(", p. 183 $K=P$F$$$kbN
??$N:G=*HG$G$"$k!#86J8GO$3$3$K:G=*HG$,:\$C$F$$$?N@$,!"$=$&$9kH!"Cf$G;H$C$F$$$k **y-axis-col**
4X?t$,:G=*HG$G$J$$$?aK!"$=$N<!$K=R$Yil$F$$$k%F%9%H$G%(%i!<$,=PF7$^$&!#)

Y-axis-column 4X?tKhCF9=@.5l$?%j%9%H$O **print-Y-axis**4X?tKEO5lk!#3l$,<B:]$K$=$N%j%
%H$rA^F~$9$k!#

```
(defun print-Y-axis
  (height full-Y-label-width)
  "Insert Y axis using HEIGHT and FULL-Y-LABEL-WIDTH.
Height must be the  maximum height of the graph.
Full width is the width of the highest label element."
;; Value of height and full-Y-label-width
;; are passed by 'print-graph'.
  (let ((start (point)))
    (insert-rectangle
     (Y-axis-column height full-Y-label-width))
    ;; %0%i%UA^F~$N=`Hw$H$7$F%]%$%s%H$r0\F0
    (goto-char start)
    ;; full-Y-label-width $NCM$NJ,$@$1%]%$%s%H$rA0J}$K0\F0
    (forward-char full-Y-label-width)))
```

print-Y-axis $O **Y-axis-column** KhCF:n@.5l$? Y <4$N%i%Y%k$rA^F~$9kN$K **insert-rectangle** $r;H$C$F$$$k!#99$K!"%0%i%U$NK\BNItJ,$rA^F~$9k?aNE,@Z$J0LCV$K%]%$%s%H$r0\F0$7$F$$$k

0J2<Nh$&$K7F **print-Y-axis** $r%F%9%H$7F_k3H,=PMh$k!#

1. $^$:<!$NJQ?t$d4X?t$r%$%s%9%H!<%k9k!#

   ```
   Y-axis-label-spacing
   Y-axis-tic
   Y-axis-element
   Y-axis-column
   print-Y-axis
   ```

2. <!$N#S<0$r%3%T!<9k!#

   ```
   (print-Y-axis 12 5)
   ```

3. '`*scratch*`' %P%C%U%!$K0\$j!"%+!<%=%k$r=D<4$N%i%Y%k$rA^F~$7$?$$0LCV$^$G0\F0$9$k!#
4. `M-ESC` (`eval-expression`) $H%?%$%W9k!#
5. `print-Y-axis` <0$r%_%K%P%C%U%!$K `C-y` (`yank`) $r;H$C$F%d%s%/$9$k!#
6. 3N#S<0$rI>2A$9k?aK `RET` $r2!$9!#

Emacs $O%i%Y%k$r=D$KI=<($9$k!#01HV>e$O '`10 -` ' G"$k!#(`print-graph` 4X?t$O!" `height-of-top-line` NCMrEO9N$@$,!":#$N>l9g$3lO 15 G"$k!#) (LuCp!' $3$3$O86J8$b:.Mp7F$$$k$_$?$$$G$" `print-Y-axis` $O `print-graph` NCfG;Hol$F$$$k!#$=$NCfGO `print-Y-axis` $KBh0l0z?t$H7FEO$5 lkNO `height-of-top-line` NCMJNG$"k,!" `print-graph` 4X?tNCfN6I=jJQ?t$H7F$N *height* $N CM$, 12 $G *Y-axis-label-spacing* NCM, 5 $@$C$?$H9k$H!"$3$N `height-of-top-line` NCM, 15 KJkH $$$&3H$r8@$$$?$+$C$?$NG"m&!#>\$7$/$O:G=*HG `print-graph` $r;2>H$N3H!#)

C.3 4X?t `print-X-axis`

X <4$N%i%Y%k$O Y <4$N%i%Y%k$HBgJQ;w$F$$$k!#0c$&$N$O!"L\@95-9f$,?t$N>e$KNC$F$$$k3HG"$k!#%
$O<!$Nh&KJ$k!#

```
    |    |     |     |
    1    5    10    15
```

:G=i$NL\@9$O%0%i%U$N:G=i$N7e$N2<$NItJ,K-F*$j!"$=$NA0$K$O4v$D$+$N6uGr$,$"$k!#$3li$N6uGr
<4$N%i%Y%k$,>eKMhkItJ,G"$k!#FsHVL\!";0HVL\!";MHVL\!"0?$$$O$=$l$KB3$/L\@9$OA4$FEy4V3VGJBs$
3N4V3V$O `X-axis-label-spacing` NCMG7h$^$k!#

X <4$NFs9TL\$O!"6uGr$KB3$/?t$+$iJk!#3N?t;z$N4V3V$b$^$? `X-axis-label-spacing` NCMKhk!#

JQ?t `X-axis-label-spacing` NCM=NbNO `symbol-width` $H$$$&C10L$r85$K7hailkY-G"$k!#
K@%0%i%U$rI=<($9k?aN%7%s%\%k$NI}$rJQ99$9$k;~$K!"%i%Y%k$NIU$1J}$^GJQ(J1lPJi$J$$$Js
Hr1?$$$@m&!#

`print-X-axis` 4X?t$OB?$+$l>/$J$+$l `print-Y-axis` 4X?t$HF1$87Ar7$F$$$k!#0c$&$N$O!"L\@9$N9T$H?t;
$N9T$NFs9T$"$k$H$$$&3HG"$k!#$3NFsD$O3F!9JL$N4X?t$G=q$$$F!" `print-X-axis` NCfG0l=oK9k3
9k!#

0J2<$,!"$3l+$i9T$&;0CJ3,$N%9%F%C%W$G$"$k!#

1. X <4$NL\@95-9f$rI=<(9k4X?t `print-X-axis-tic-line` $r=q$/!#
2. X <4$N?t;z$rI=<(9k4X?t `print-X-axis-numbered-line` $r=q$/!#
3. 3N `print-X-axis-tic-line` $H `print-X-axis-numbered-line` $r;H$C$F!">e$NFsDN9T$rN>J}$H $bI=<($9$k4X?t `print-X-axis` $r=q$/!#

C.3.1 X <4$NL\@95-9f

:G=i$N4X?t$G$O!" X <4$NL\@95-9f$rI=<($9$k!#$^$:$O!"L\@95-9fH=$N4V$N5-9f$r;XDj$7$J$$$H$$$1J

```
(defvar X-axis-label-spacing
  (if (boundp 'graph-blank)
      (* 5 (length graph-blank)) 5)
  "Number of units from one X axis label to next.")
```

(**graph-blank** NCMO$^$?JL$N **defvar** $G@_Dj$5lk3H$KCm0U$7h&!# **boundp** $H$$$&=R8l$O!"4{$K2?$+$
CM$,%;%C%H$5lF$$$k$+$I$&$+$rH=Dj$9kbNG$"$k!#b72?$b%;%C%H$5lF$$$J1l$P!" **boundp** $O **ni**
JV$9!#$b$7 **graph-blank** $,@_Dj$5l:!"$^$?!"3N>r7oJ,4t<0$,$J$+$C$?$H9k$H!" **Symbol's value as**
variable is void $H$$$&%(%i!<%a%C%;!<%8$r<u$1Hk3HKJ$k!#

```
(defvar X-axis-tic-symbol "|"
  "String to insert to point to a column in X axis.")
```

L\I8$O!"<!$Nh&$J9T$r:n@.9k3HG"$k!#

```
      |   |    |    |
```

:G=i$NL\@9$O!" Y <4$N%i%Y%k$N$?$a$N%9%Z!<%9$r6u1k$?$a$K%$%s%G%s%H5l$?:G=i$NK@%0%i%U$N3+;O
F1$8$@$1%$%s%G%s%H7J$$$H$$$1$J$$!#

L\@9$NMWAG$O!"$"$kL\@9$+$i<!$NL\@9$^GN%9%Z!<%9$HL\@95-9f$+iJ$k!#6uGr$N?t$OL\@95-9f$NI}
axis-label-spacing $+$i7h$^$k!#

%3!<%I$O<!$NDLjG$"$k!#

```
;;; X-axis-tic-element
...
(concat
 (make-string
  ;; 6uGr$NJ8;zNs$r:n@.
  (-  (* symbol-width X-axis-label-spacing)
      (length X-axis-tic-symbol))
  ? )
 ;; 6uGr$rL\@95-9f$H7k9g
 X-axis-tic-symbol)
...
```

<!$K!":G=i$NL\@9$r%0%i%U$N3+;O0LCV$^$G%$%s%G%s%H$9k?aK!"Il$@$16uGr$,MW$k$+$r?t$($kI,MW$,
3lKO!" **print-graph** 4X?tKhCFEO5l$? **full-Y-label-width** NCMrMxMQ9k!#

X-axis-leading-spaces $r:n$k$?$a$N%3!<%I$O<!NDLjG"$k!#

```
;; X-axis-leading-spaces
...
(make-string full-Y-label-width ? )
...
```

$^$?!"2#<4$ND9$5$b7h$aJ1lPJi$J$$!#3l$O!"?t$N%j%9%H$ND9$G$"$k!#99$K!"2#<4$NL\@9$N?t$b7
MW$,$"$k!#

```
;; X-length
...
(length numbers-list)

;; tic-width
...
(* symbol-width X-axis-label-spacing)
```

```
;; number-of-X-tics
(if (zerop (% (X-length tic-width)))
    (/ (X-length tic-width))
  (1+ (/ (X-length tic-width))))
```

3lir;H$&$H!" X <4$NL\@9$N9T$rI=<($9$k4X?t$O<!Nh$&$KJk!#

```
(defun print-X-axis-tic-line
  (number-of-X-tics X-axis-leading-spaces X-axis-tic-element)
  "Print tics for X axis."
    (insert X-axis-leading-spaces)
    (insert X-axis-tic-symbol)  ; :G=i$N7e$N2<$K
    ;; 1&$N0LCV$KFsHVL\$NL\@95-9f$rA^F~
    (insert (concat
             (make-string
              (-  (* symbol-width X-axis-label-spacing)
                  ;; FsHVL\$NL\@95-9f$^$G6uGr$rA^F~
                  (* 2 (length X-axis-tic-symbol)))
              ? )
             X-axis-tic-symbol))
    ;; ;D$j$NL\@95-9f$rA^F~
    (while (> number-of-X-tics 1)
      (insert X-axis-tic-element)
      (setq number-of-X-tics (1- number-of-X-tics))))
```

?t;z$N9T$bF1MMK7$F4JC1$K=q1k!#

$^$:$OA0$K6uGr$NIU$$$?HV9f$r:n@.$9$k!#

```
(defun X-axis-element (number)
  "Construct a numbered X axis element."
  (let ((leading-spaces
         (-  (* symbol-width X-axis-label-spacing)
             (length (int-to-string number)))))
    (concat (make-string leading-spaces ? )
            (int-to-string number))))
```

<!$K!"?t;z$N$D$$$?9T$rI=<($9k?aN4X?t$r:n$k!#3lO^$::G=i$N7e$K?t “1” rIU1kH3m$+$
$k!#

```
(defun print-X-axis-numbered-line
  (number-of-X-tics X-axis-leading-spaces)
  "Print line of X-axis numbers"
  (let ((number X-axis-label-spacing))
    (insert X-axis-leading-spaces)
    (insert "1")
    (insert (concat
             (make-string
              ;; <!$N?t;z$N=j$^$G6uGr$rA^F~
              (-  (* symbol-width X-axis-label-spacing) 2)
              ? )
             (int-to-string number)))
```

```
    ;; ;D$j$N?t;z$rA^F~
    (setq number (+ number X-axis-label-spacing))
    (while (> number-of-X-tics 1)
      (insert (X-axis-element number))
      (setq number (+ number X-axis-label-spacing))
      (setq number-of-X-tics (1- number-of-X-tics)))))
```

:G8e$K!" `print-X-axis-tic-line` $H `print-X-axis-numbered-line` $r;H$C$F!" `print-X-axis` $r =q$/!#

3N4X?tGO `print-X-axis-tic-line` $H `print-X-axis-numbered-line` $NN>J}$G;Hol$F$$$k6I=jJQ?tNCMr7hDj7F$+$i!"3liN4X?t$r8F$S=P5J1lPJiJ$$!#$^$?!"FsDN9T$N6h@Z$j$KI|5"%3!<($9kI,MWb$"$k!#

3N4X?t$O!"5 DN6I=jJQ?t$r;XDj9kJQ?t%j%9%H$HFsDN9T$rI=<(9k4X?t$N8F$S=P7+$iJk!#

```
(defun print-X-axis (numbers-list)
  "Print X axis labels to length of NUMBERS-LIST."
  (let* ((leading-spaces
          (make-string full-Y-label-width ? ))
       ;; symbol-width $O graph-body-print $GM?$($i$l$k!#
       (tic-width (* symbol-width X-axis-label-spacing))
       (X-length (length numbers-list))
       (X-tic
        (concat
         (make-string
          ;; 6uGr$NJ8;zNs$r:n@.
          (-  (* symbol-width X-axis-label-spacing)
              (length X-axis-tic-symbol))
          ? )
         ;; 6uGr$rL\@95-9f$H7k9g
         X-axis-tic-symbol))
       (tic-number
        (if (zerop (% X-length tic-width))
            (/ X-length tic-width)
          (1+ (/ X-length tic-width)))))
    (print-X-axis-tic-line tic-number leading-spaces X-tic)
    (insert "\n")
    (print-X-axis-numbered-line tic-number leading-spaces)))
```

3l$G!" `print-X-axis` $N%F%9%H$,=PMh$k!#

1. $^$:$O `X-axis-tic-symbol`, `X-axis-label-spacing`, `print-X-axis-tic-line`, JI$NJQ?tHHbK `X-axis-element`, `print-X-axis-numbered-line`, `print-X-axis` $H$$$&4X?t$r%$%s%9%H!<%k9k!#
2. <!$N#S<0$r%3%T!<9k!#

   ```
   (progn
    (let ((full-Y-label-width 5)
          (symbol-width 1))
      (print-X-axis
       '(1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16))))
   ```

3. '`*scratch*`' %P%C%U%!$K0\$j!"%+!<%=%k$r<4$N%i%Y%k$rI=<($7$?$$0LCVK^$GF0$+$9!#
4. `M-ESC` (`eval-expression`) $H%?%$%W9k!#
5. `C-y` (`yank`) $r;H$C$F!"%F%9%H$N#S<0$r%d%s%/$9$k!#

6. $=$N<0$rI>2A$9k?aK!" RET $r2!$9!#

$3$1$G Emacs $O<!$Nh&$J2#<4$rI=<(7F$/$1kO$:$@!#

```
|   |    |    |    |
1   5    10   15   20
```

C.4 %0%i%UA4BN$NI=<(

5F!"$3$1$G%0%i%UA4BN$rI=<(9k=`Hw$,@0$C$?!#

$-$AsH7?%i%Y%k$,IU$$$?%0%i%U$rI=<($9$k4X?t$r=q$/:]$K$O!"0JA0:n@.$7$?%"%&%H%i%$%s$K=>$&$o
(Appendix C, “%i%Y%k$H<4$NIU$$$?%0%i%U”, p. 173, ;2>H)!"4vD+DI2C9k3H$,$"$k!#

%"%&%H%i%$%s$O0J2<Nh$&$JbN$@$C$?!#

```
(defun print-graph (numbers-list)
  "documentation..."
  (let ((height  ...
        ...))
    (print-Y-axis height ... )
    (graph-body-print numbers-list)
    (print-X-axis ... )))
```

:G=*E*$J%P!<%8%g%s$O!">e$N7W2h$HOFsD$NE@$G0cCF$$$k!#$^$:!"JQ?t%j%9%HNCfGDI2C7F7W;;9k
$"$k!#<!$K!"%i%Y%k$NA}2CN5$;J}$r;XDj9k%*%W%7%g%s$,$"$k!#8e<T$NFCD'O+JjK\<AE*G"$k!#$=$
3HKO!"2hLL$d;fLL$K9goJ$/$JCF7^$&2DG=@-$,$"$k$+$i$@!#

3N?7$7$$FCD'$r<B8=$9kK$O!" Y-axis-column 4X?t$K$$$/i+JQ99$r2C$($F vertical-step $H$$$&JQ
?t$r2C$(kI,MW,$"$k!#F1;~$K!" print-Y-axis $b=q49$($k!#?7$7$$4X?t$O<!$Nh&KJ$k!#

```
;;; :G=*%P!<%8%g%s!#
(defun Y-axis-column
  (height width-of-label &optional vertical-step)
  "Construct list of labels for Y axis.
HEIGHT is maximum height of graph.
WIDTH-OF-LABEL is maximum width of label.
VERTICAL-STEP, an option, is a positive integer
that specifies how much a Y axis label increments
for each line.  For example, a step of 5 means
that each line is five units of the graph."
  (let (Y-axis
        (number-per-line (or vertical-step 1)))
    (while (> height 1)
      (if (zerop (% height Y-axis-label-spacing))
          ;; %i%Y%k$NA^F~
          (setq Y-axis
                (cons
                 (Y-axis-element
                  (* height number-per-line)
                  width-of-label)
                 Y-axis))
```

```
          ;; $=$&$G$J$$>l9g$O, 6uGr$NA^F~
          (setq Y-axis
                (cons
                 (make-string width-of-label ? )
                 Y-axis)))
        (setq height (1- height)))
      ;; %Y!<%9%i%$%s$NA^F~
      (setq Y-axis (cons (Y-axis-element
                          (or vertical-step 1)
                          width-of-label)
                         Y-axis))
      (nreverse Y-axis)))

;;; :G=*%P!<%8%g%s!#
(defun print-Y-axis
  (height full-Y-label-width &optional vertical-step)
  "Insert Y axis using HEIGHT and FULL-Y-LABEL-WIDTH.
Height must be the  maximum height of the graph.
Full width is the width of the highest label element.
Optionally, print according to VERTICAL-STEP."
;; Value of height and full-Y-label-width
;; are passed by 'print-graph'.
  (let ((start (point)))
    (insert-rectangle
     (Y-axis-column height full-Y-label-width vertical-step))
    ;; Place point ready for inserting graph.
    (goto-char start)
    ;; Move point forward by value of full-Y-label-width
    (forward-char full-Y-label-width)))
```

%0%i%U$N:GBg$N9b5NCM$H%7%s%\%k$NI}$O `print-graph` NCfN `let` <0KhCF7W;;$5$1$k!#=>$C$F
`graph-body-print` O=li$r<u$1<hk3H,=PMhkh$&$KJQ99$7$J1lPJiJ$$!#

```
;;; :G=*%P!<%8%g%s!#
(defun graph-body-print (numbers-list height symbol-width)
  "Print a bar graph of the NUMBERS-LIST.
The numbers-list consists of the Y-axis values.
HEIGHT is maximum height of graph.
SYMBOL-WIDTH is number of each column."
  (let (from-position)
    (while numbers-list
      (setq from-position (point))
      (insert-rectangle
       (column-of-graph height (car numbers-list)))
      (goto-char from-position)
      (forward-char symbol-width)
      ;; 3F7e$4$H$K%0%i%U$rIA<L
      (sit-for 0)
      (setq numbers-list (cdr numbers-list)))
    ;; X <4$N%i%Y%k$N$?$a$K%]%$%s%H$r0\F0
    (forward-line height)
    (insert "\n")))
```

:G8e$K!" print-graph 4X?t$N%3!<%I$r:\$;F*3&!#

```
;;; :G=*%P!<%8%g%s!#
(defun print-graph
  (numbers-list &optional vertical-step)
  "Print labelled bar graph of the NUMBERS-LIST.
The numbers-list consists of the Y-axis values.

Optionally, VERTICAL-STEP, a positive integer,
specifies how much a Y axis label increments for
each line.  For example, a step of 5 means that
each row is five units."
  (let* ((symbol-width (length graph-blank))
         ;; height $O:GBg$N?t$G$b$"$j!"
         ;; :GBg7e$N?t$G$b$"$k!#
         (height (apply 'max numbers-list))
         (height-of-top-line
          (if (zerop (% height Y-axis-label-spacing))
              height
            ;; else
            (* (1+ (/ height Y-axis-label-spacing))
               Y-axis-label-spacing)))
         (vertical-step (or vertical-step 1))
         (full-Y-label-width
          (length
           (concat
            (int-to-string
             (* height-of-top-line vertical-step))
            Y-axis-tic))))

    (print-Y-axis
     height-of-top-line full-Y-label-width vertical-step)
    (graph-body-print
     numbers-list height-of-top-line symbol-width)
    (print-X-axis numbers-list)))
```

C.4.1 print-graph $N%F%9%H

print-graph 4X?t$rC;$$?t$N%j%9%H$G;n7F$_$h$&!#

1. (B>$N%3!<%I$K2C$($F) Y-axis-column!" print-Y-axis!" graph-body-print!"$=$7$F print-graph $N3F:G=*%P!<%8%g%s$r%$%s%9%H!<%k$9$k!#
2. <!$N#S<0$r%3%T!<9k!#

   ```
   (print-graph '(3 2 5 6 7 5 3 4 6 4 3 2 1))
   ```

3. '*scratch*' %P%C%U%!$K0\$j!"%+!<%=%k$r%0%i%U$rI=<(7?$$0LCVK^$G0\F0$9$k!#
4. M-ESC (eval-expression) $H%?%$%W9k!#
5. C-y (yank) $r;H$C$F!">e$N#S<0$r%_%K%P%C%U%!$K%d%s%/9k!#
6. 3N#S<0$rI>2A$9k?aK RET $r2!$9!#

Emacs $O<!$Nh&$J%0%i%U$rI=<(9k!#

```
10 -


        *
       **   *
 5 -  ****  *
      **** ***
    * *********
    ************
 1 - *************

    |   |    |    |
    1   5    10   15
```

0lJ}!"<!$N#S<0$rI>2A7F `print-graph` $K `vertical-step` H7$F 2 $rM?$(F_$?$H9k!#

```
(print-graph '(3 2 5 6 7 5 3 4 6 4 3 2 1) 2)
```

9k$H%0%i%U$O<!Nh$&$KJkO:$@!#

```
20 -


        *
       **   *
10 -  ****  *
      **** ***
    * *********
    ************
 2 - *************

    |   |    |    |
    1   5    10   15
```

(5?Ld!'2#<4$N:8$N '2' $O%P%0$@m&$+!";EMM$@m&$+!#$b$7%P%0$G$"$k$H;W$&NJ$i!"$=7F '2' GOJ/
$"$kY-$@$H;W$&$NJi (0?$$$O '0' G"kY$-$@$H;W$&NJ$i)!"%=!<%9$r=$@5$9lP$h$$!#)

C.4.2 C18l$d%7%s%\%k$N?t$N%0%i%U2=

5F!"dC$HL\E*$N%0%i%U$N=j$^GMh?!#$$$h$$$hC18l$d%7%s%\%k$N?t$, 10 hj>/$J$$4X?tDj5A$,$I$l
k+!" 10 $+$i 19 $^$G$N4V$@HIl@1+!" 20 $+$i 29 $^$G$@$HI&$+!"$H$$$C$?$3Hr<(7F$/$l$k%0%i
IA$/4X?t$r=q$/$o1G$"$k!#

3l$O4v$D$+$N%W%m%;%9$KJ,$1$F9T$&!#$^$:$O!"I,MW$J%3!<%I$rA4$F%m!<%I7F$"$k3H$r3NG'$7h&!#

0[JkCM$r@_Dj$7F7$^$C$?>l9g$KHw$($F!" `top-of-ranges` NCMr:F@_Dj7F$*$/J}$,$h$$$@m&!#$=$
$O0J2<$rI>2A9lPh$$!#

```
(setq top-of-ranges
 '(10  20  30  40  50
   60  70  80  90 100
  110 120 130 140 150
  160 170 180 190 200
  210 220 230 240 250
  260 270 280 290 300)
```

<!$K!"3F!9$NHO0O$KF~$C$F$$$kC18l$d%7%s%\%k$N?t$N%j%9%H$r:n@.7h$&!#

$^$:<!$rI>2A$9$k!#

```
(setq list-for-graph
       (defuns-per-range
         (sort
          (recursive-lengths-list-many-files
           (directory-files "/usr/local/emacs/lisp"
                            t ".+el$"))
          '<)
         top-of-ranges))
```

;d$N5!3#$G$O!"$3lK0l;~4VDx$+$+C?!#;d$N;}$C$F$$$k Emacs version 19.23 $@$H 303 $N Lisp %U%!%$%k$r8
$F$$$k3HKJ$k!#$3$N7W;;$N8eGO!" **list-for-graph** NCMO<!Nh$&$KJk!#

```
(537 1027 955 785 594 483 349 292 224 199 166 120 116 99
90 80 67 48 52 45 41 33 28 26 25 20 12 28 11 13 220)
```

3l$O!";d$N Emacs KO 10 0J2<$NC18l$d%7%s%\%k7+;}$?$J$$4X?tDj5A$, 537 8D$"$j!" 10 0J>e 19 L$K~$
8l$d%7%s%\%k$r;}DbN, 1,027 8D!" 20 $+$i 29 $^$G$@$H 955 8D!"JI$H$$$&U&KJCF$$$k3H$r<($7
$k!#

3N%j%9%H$+$iL@i+$K8+$F<hlk3H$O!"KX$I$N4X?tDj5A$G$O!"Cf$K4^$^$l$kC18l$d%7%s%\%k$N?t$O!
$i 30 $^$G$@$H$$$&3HG"$k!#

5F!"3l$r%0%i%U$KI=<(9k3HK7h&!#2f!9$O!" 1,030 9T$b$N9b$5$N%0%i%U$OIA$-$?$/$J$$!#$=$
J/!" 25 9T0J2<DxEY$N%0%i%U$rIA$-$?$$$NG"$k!#$3$N9b$5$N%0%i%U$G$"$l$P!"BgDq$N%b%K%?$GI=<(=PMh
$&!#$^$?!";f$K$b0u:~$7d9$$!#

3l$O!":#$N>l9g!" **list-for-graph** $N3F!9$NCM$r 50 J,$N 1 $K=L>.$7$J$$$H$$$1$J$$$H$$$&3HG"$k!

3NA`:nrdCF$/$l$k4JC1$J4X?t$r!"0J2<$K5s2k!#3N4X?tKO!":#$^$G$K=P$F3J$+$C$?Fs$D
mapcar $H **lambda** $,=P$F$/$k!#

```
(defun one-fiftieth (full-range)
  "Return list, each number one-fiftieth of previous."
 (mapcar '(lambda (arg) (/ arg 50)) full-range))
```

lambda <0

lambda $OL5L>4X?t!"B($AL>A0NJ$$4X?t$N%7%s%\%k$G$"$k!#L5L>4X?t$r;H$&>l9gKOKh2sK\BN$rA4$F4^$
$+$J1lPJiJ$$!#

=>CF!"

```
(lambda (arg) (/ arg 50))
```

G"1P!">o$K **arg** H7FEO5$1$?bN$r 50 $G3d$C$?CM$rJV$9!"$H$$$&4X?tDj5AKJ$k!#

Nc$($P!"0JA0!" **multiply-by-seven** 4X?t$H$$$&Nr@bL@7?3H$,$"$k!#$3lO0z?t$r 7 G\$9kb$N $"$C$?!#:#2s$N4X?t$bF1MM$G$"$k!#0[JkE@$O!"0z?t$r 50 $G3d$k$H$$$&3H$H!"L>A0$,$J$$$H$$$&3H$@ $k!# **multiply-by-seven** $rL5L>4X?t$G=q$-D>$9$H<!$Nh&KJ$k!#

```
(lambda (number) (* 7 number))
```

(Section 3.1, “FC<17A<0 **defun**”, p. 19, $r;2>H!#)

b7 3 $r 7 G\$7$?$$$J$i!"<!$Nh&$K=q$/3H$,=PMh$k!#

```
(multiply-by-seven 3)
 \_______________/ ^
         |         |
      function  argument
```

3N#S<0$O 21 rJV9!#

F1MM$K!"<!$Nh&Kb=q1k!#

```
((lambda (number) (* 7 number)) 3)
 \____________________________/ ^
               |                |
      anonymous function     argument
```

100 $r 50 $G3d$k>l9g$O<!$Nh&$K=q$/!#

```
((lambda (arg) (/ arg 50)) 100)
 \______________________/  \_/
             |              |
    anonymous function   argument
```

3N#S<0$O 2 rJV9!#>e$N 100 $O4X?t$KEO$5$1kbNG!"$=$N?t$r4X?t$, 50 $G3d$C$F$$$kNG$"$k!#

lambda KD$$$FNh$j>\$7$$$3HO!" Section “Lambda Expressions” in *The GNU Emacs Lisp Reference Manual*, $r;2>H$;$h!# Lisp $d lambda <0$O!" Lambda 7W;;$+$iGI@8$7$?bNG"$k!#

4X?t mapcar

mapcar $O:G=i$N0z?t$rFsHVL\$N0z?t$N3F!9$NMWAGKHbK!"=g$K8F$S=P$94X?t$G$"$k!#FsHVL\$N0z?t$O% %s%9 (sequence) GJ$$$H$$$1$J$$!#

Nc$($P!"

```
(mapcar '1+ '(2 4 6))
     ⇒ (3 5 7)
```

$H$$$&46$8$G$"$k!#4X?t **1+** $O0z?t$K 1 $r2C$($k4X?t$G$"$k$,!"$3l,$=$N8e$N%j%9%H$N3FMWAGKD$$$F< $l!"?7$7$$%j%9%HrJV9o1G"$k!#

3l$r **apply** $HHf3S$7F_h&!#3AiO:G=i$NMWAG$KBP$7!"FsHVL\0J9_$NA4FN0z?t$r0z?t$H7FEO$ 9T5;kbN@C?!# (**apply** $N@bL@$K$D$$$F$O Chapter 15, “%0%i%U$rIA$/=`Hw”, p. 133, $r;2>H!#)

one-fiftieth $NDj5A$G$O!":G=i$N0z?t$O!"

```
(lambda (arg) (/ arg 50))
```

$H$$$&L5L>4X?tG"$k!#$^$?!"FsHVL\$N0z?t$O **full-range** G"$j!"$3lO **list-for-graph** $K%P%$%s%I$
lk!#

#S<0A4BN$O<!$NDLjG$"$k!#

```
(mapcar '(lambda (arg) (/ arg 50)) full-range))
```

mapcar KD$$$F$N>\:Y$O Section "Mapping Functions" in *The GNU Emacs Lisp Reference Manual*,
$r;2>H!#

one-fiftieth 4X?t$r;H$&$H!"3F!9$NMWAG$,!"BP1~$9$k **list-for-graph** $NMWAG$N 50 J,$N 1 G"kh$&$J
%j%9%H$r@8@.$9k3H,=PMh$k!#

```
(setq fiftieth-list-for-graph
      (one-fiftieth list-for-graph))
```

7k2LH7$F=PMh$k%j%9%H$O<!$Nh&KJ$k!#

```
(10 20 19 15 11 9 6 5 4 3 3 2 2
1 1 1 1 0 1 0 0 0 0 0 0 0 0 0 0 0 4)
```

3l$O!":#$9$0$KGbI=<(=PMh$=$&G"$k!* ($bCHb3$3$G>pJs$,<:$olF$$$k3HKb5IU/!#>e$NJ
$NB?$/$NMWAG$O 0 G"$k!#$3lO!"$=$NHO0O$NC18l$d%7%s%\%k$r;}$D4X?tDj5A$N?t$, 50 L$K~$G$"$k3H$r
$$$k$@$1G"CF!"$=$&$$$&4X?tDj5A$,A4$/$J$$$H$$$C$F$$$ko1GO$J$$!#)

$^$@%P%0$,$"$k ...

;d$O!"!V:#$9$0$KGbI=<(=PMh$=$&!W$H=q$$$?!#L^O@!" **print-graph** KO%P%0$,$"kN$@ ... 3l$K
vertical-step %*%W%7%g%s$,$"k,!" **horizontal-step** %*%W%7%g%sOJ$$!# **top-of-range** $NHO0O$O!"
10 4H$K 10 $+$i 300 $^$G$"$k!#7+$7!" **print-graph** $O 1 $:$D7+I=<(=PMh$J$$!#

3l$O!"$"$k?M!9$,:G$b8+$D1K$/$$%?%$%W$N%P%0$@$H9M$($F$$$k!"9MN8ITB-Kh$k%P%0 (LuCp!'86J8$G$
of omission. 3lOI$&Lu$9Y-$+) $N8EE5E*$JNcG"$k!#$3lO!"%3!<%I$rD4$Yk3HG8+D+kh$&$J
GO$J$$!#%3!<%I<+BN$K8m$jOJ$$$+i@!#3l$OC1$K2?$+$,7gMn7F$$$k$H$$$&3HG"$k!#$3Nh$&$
BP9kbCHb@5$7$$BVEY$O!"%W%m%0%i%`$rJkY/Aa$/!"2?2s$b%F%9%H7F$_$k3HG"$k!#$=7F!"%
=PMhk@$1M}2r$7d9$/4JC1$KJQ99=PMhkh$&$K%"%l%s%8$7$F$$$/NG$"$k!#$^$?!"0lEY=q$$$?bN$O!"$
OJ$/$H$b$$$D$+$O=q49$($ilkbN$@$H$$$&3H$rF,$KF~lF$*$/h&K7h&!#3lOJ$+$J$+<B9T$
3J8@GO$"$k$,!#

:n6HBP>]HJkN$O **print-X-axis-numbered-line** 4X?tG"$k!#$^$?!" **print-X-axis** $H **print-graph** b=lK9go;$F=q49$(kI,MW,$"$k!#bCHbdk3HO=$lDxB?$$$o1GOJ$$!#0lD@$1LLE
J,$,$"$k!#?t;z$,!"L\@95-9f$N2<$Ke:NoKJBPJ1lPJi$J$$$H$$$&3HG"$k!#$3$NE@$OAgCHP
RMkI,MW,$"$k!#

0J2<$,=$@5$7$? **print-X-axis-numbered-line** G"$k!#

```
(defun print-X-axis-numbered-line
  (number-of-X-tics X-axis-leading-spaces
   &optional horizontal-step)
  "Print line of X-axis numbers"
  (let ((number X-axis-label-spacing)
        (horizontal-step (or horizontal-step 1)))
```

```
    (insert X-axis-leading-spaces)
    ;; F,$NM>7W$J6uGr$r:o=|
    (delete-char
     (- (1-
         (length (int-to-string horizontal-step)))))
    (insert (concat
             (make-string
              ;; 6uGr$rA^F~
              (-  (* symbol-width
                     X-axis-label-spacing)
                  (1-
                   (length
                    (int-to-string horizontal-step)))
                  2)
              ? )
             (int-to-string
              (* number horizontal-step))))
    ;; ;D$j$N?t$rA^F~
    (setq number (+ number X-axis-label-spacing))
    (while (> number-of-X-tics 1)
      (insert (X-axis-element
               (* number horizontal-step)))
      (setq number (+ number X-axis-label-spacing))
      (setq number-of-X-tics (1- number-of-X-tics)))))
```

b7$"$J$?$,3l$r Info NCfGFIsG$$$kJi!" **print-X-axis** $H **print-graph** $N?7$7$$%P!<%8%g%s$r
8+k3H,=PMh$k!#$b$7$3lr0u:~5l$?K\$GFIsG$$$kH7$?$i!"JQ99$9$k9T$,2<$K=q$+$l$F$$$kO:$
:~9kKO%3!<%I$,$AgC$HB?2a$.kN$G!#)

```
(defun print-X-axis (numbers-list horizontal-step)
  ...
    (print-X-axis-numbered-line
     tic-number leading-spaces horizontal-step))

(defun print-graph
  (numbers-list
   &optional vertical-step horizontal-step)
  ...
    (print-X-axis numbers-list horizontal-step))
```

C.4.3 I=<(5l$?%0%i%U

A4Fr%$%s%9%H!<%k$7=*C?$i!" **print-graph** %3%^%s%I$r<!$Nh&K7$F8F$S=P$=$&!#

```
(print-graph fiftieth-list-for-graph 50 10)
```

<!Nh$&$J%0%i%U$,I=<($5lkO:$@!#

```
1000 -  *
        **
        **
        **
        **
 750 -  ***
        ***
        ***
        ***
        ****
 500 - *****
       ******
       ******
       ******
       *******
 250 - ********
       *********                     *
       ***********                   *
       *************                 *
  50 - ***************** *           *
       |   |    |    |    |    |    |    |
      10  50  100  150  200  250  300  350
```

:GbBg-$J4X?t$N%0%k!<%W$O!" 10 $+$i 19 $^$G$NC18l$d%7%s%\%k$r4^$s$G$$$kbN$N%0%k!<%W$G$"$k!#

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About the Author

(`LuCp!'0J2<$O86J8$r$=$N$^$^:\$;$F$*$/$3$H$K$9$k!#`)

Robert J. Chassell has worked with GNU Emacs since 1985. He writes and edits, teaches Emacs and Emacs Lisp, and is a director and the Secretary/Treasurer of the Free Software Foundation, Inc. He has an abiding interest in social and economic history and flies his own airplane.

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