GNU Calc Reference Card

(for GNU Emacs version 24)

Starting and Stopping

start/stop standard Calc	C-x * c
start/stop X keypad Calc	C-x * k
start/stop either: C-x * *	
stop standard Calc	q
Calc tutorial	C-x * t
run Calc in other window	C-x * o
quick calculation in minibuffer	C-x * q

Getting Help

The h prefix key is Calc's analogue of C-h in Emacs.

quick summary of keys	?
describe key briefly	h c
describe key fully	h k
describe function or command	h f
read Info manual	h i or C-x * i
read full Calc summary	h s or C-x * s

Error Recovery

abort command in progress	C-g
display recent error messages	w
undo last operation	U
redo last operation	D
recall last arguments	M-RET
edit top of stack	`
reset Calc to initial state	C-x * 0 (zero)

Transferring Data

grab region from a buffer	C-x * g
grab rectangle from a buffer	C-x * r
grab rectangle, summing columns	C-x * :
grab rectangle, summing rows	C-x * _
yank data to a buffer	C-x * y

Also, try C-k/C-y or X cut and paste.

Examples

In RPN, enter numbers first, separated by RET if necessary, then type the operator. To enter a calculation in algebraic form, press the apostrophe first.

	RPN style:	algebraic style:
Example:	2 RET 3 +	' 2+3 RET
Example:	2 RET 3 + 4 *	' (2+3)*4 RET
Example:	2 RET 3 RET 4 + *	' 2*(3+4) RET
Example:	3 RET 6 + Q 3 ^	' sqrt(3+6)^3 RET
Example:	P 3 / n S	' sin(-pi/3) RET =

Arithmetic

add, subtract, multiply, divide	+, -, *, /
raise to a power, nth root	^, I ^
change sign	n
reciprocal $1/x$	&
square root $\sqrt{x}$	Q
set precision	p
round off last two digits	c 2
convert to fraction, float	c F, c f
enter using algebraic notation	' 2+3*4
refer to previous result	' 3*$^2
refer to higher stack entries	' $1*$2^2
finish alg entry without evaluating	LFD
set mode where alg entry used by default	m a

Stack Commands

Here S_n is the nth stack entry, and N is the size of the stack.

key	no prefix	prefix n	prefix $-n$
RET	copy S_1	copy $S_{1..n}$	copy S_n
LFD	copy S_2	copy S_n	copy $S_{1..n}$
DEL	delete S_1	delete $S_{1..n}$	delete S_n
M-DEL	delete S_2	delete S_n	delete $S_{1..n}$
TAB	swap $S_1 \leftrightarrow S_2$	roll S_1 to S_n	roll S_n to S_N
M-TAB	roll S_3 to S_1	roll S_n to S_1	roll S_N to S_n

With a 0 prefix, these copy, delete, or reverse the entire stack.

Display

scroll horizontally, vertically	< >, { }
home cursor	o
line numbers on/off	d l
trail display on/off	t d
scientific notation	d s
fixed-point notation	d f
floating-point (normal) notation	d n
group digits with commas	d g

For display mode commands, H prefix prevents screen redraw and I prefix temporarily redraws top of stack.

Notations

scientific notation	6.02e23
minus sign in numeric entry	_23 or 23 n
fractions	3:4
complex numbers	$(x,\ y)$
polar complex numbers	$(r;\ \theta)$
vectors (commas optional)	[1, 2, 3]
matrices (or nested vectors)	[1, 2; 3, 4]
error forms (p key)	100 +/- 0.5
interval forms	[2 .. 5)
modulo forms (M key)	6 mod 24
HMS forms	5@ 30' 0"
date forms	<Jul 4, 1992>
infinity, indeterminate	inf, nan

Scientific Functions

ln, $\log_{10}$, $\log_b$	L, H L, B
exponential e^x, 10^x	E, H E
sin, cos, tan	S, C, T
arcsin, arccos, arctan	I S, I C, I T
inverse, hyperbolic prefix keys	I, H
two-argument arctan	f T
degrees, radians modes	m d, m r
pi (π)	P
factorial, double factorial	!, k d
combinations, permutations	k c, H k c
prime factorization	k f
next prime, previous prime	k n, I k n
GCD, LCM	k g, k l
random number, shuffle	k r, k h
minimum, maximum	f n, f x
error functions erf, erfc	f e, I f e
gamma, beta functions	f g, f b
incomplete gamma, beta functions	f G, f B
Bessel J_ν, Y_ν functions	f j, f y
complex magnitude, arg, conjugate	A, G, J
real, imaginary parts	f r, f i
convert polar/rectangular	c p

Financial Functions

enter percentage	M-%
convert to percentage	c %
percentage change	b %
present value	b P
future value	b F
rate of return	b T
number of payments	b #
size of payments	b M
net present value, int. rate of return	b N, b I

Above computations assume payments at end of period. Use I prefix for beginning of period, or H for a lump sum investment.

straight-line depreciation	b S
sum-of-years'-digits	b Y
double declining balance	b D

Units

enter with units	' 55 mi/hr
convert to new units, base units	u c, u b
convert temperature units	u t
simplify units expression	u s
view units table	u v

Common units:
   distance: m, cm, mm, km; in, ft, mi, mfi; point, lyr
   volume: l or L, ml; gal, qt, pt, cup, floz, tbsp, tsp
   mass: g, mg, kg, t; lb, oz, ton
   time: s or sec, ms, us, ns, min, hr, day, wk
   temperature: degC, degF, K

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Programmer's Functions

binary, octal, hex display	d 2, d 8, d 6
decimal, other radix display	d 0, d r
display leading zeros	d z
entering non-decimal numbers	16#7FFF
binary word size	b w
binary AND, OR, XOR	b a, b o, b x
binary DIFF, NOT	b d, b n
left shift	b l
logical right shift	b r
arithmetic right shift	b R
integer quotient, remainder	\, %
integer square root, logarithm	f Q, f I
floor, ceiling, round to integer	F, I F, R

Variables

Variable names are single digits or whole words.

store to variable	s t
store and keep on stack	s s
recall from variable	s r
shorthands for digit variables	t n, s n, r n
unstore, exchange variable	s u, s x
edit variable	s e

Vector Operations

vector of 1, 2, ..., n	v x n
vector of n counts from a by b	C-u v x
vector of copies of a value	v b
concatenate into vector	|
pack many stack items into vector	v p
unpack vector or object	v u
length of vector (list)	v l
reverse vector	v v
sort, grade vector	V S, V G
histogram of vector data	V H
extract vector element	v r
matrix determinant, inverse	V D, &
matrix transpose, trace	v t, V T
cross, dot products	V C, *
identity matrix	v i
extract matrix row, column	v r, v c
intersection, union, diff of sets	V ^, V V, V -
cardinality of set	V #
add vectors elementwise (i.e., map +)	V M +
sum elements in vector (i.e., reduce +)	V R +
sum rows in matrix	V R _ +
sum columns in matrix	V R : +
sum elements, accumulate results	V U +

Algebra

enter an algebraic formula	' 2x+3y^2
enter an equation	' 2x^2=18
symbolic (vs. numeric) mode	m s
fractions (vs. float) mode	m f
suppress evaluation of formulas	m O
return to default evaluation rules	m D
"Big" display mode	d B
C, Pascal, FORTRAN modes	d C, d P, d F
TEX, LaTEX, eqn modes	d T, d L, d E
Maxima	d X
Unformatted mode	d U
Normal language mode	d N
simplify formula	a s
put formula into rational form	a n
evaluate variables in formula	=
evaluate numerically	N
let variable equal a value in formula	s l $x=val$
declare properties of variable	s d
Common decls: pos, int, real, scalar, $[a..b]$.	
expand, collect terms	a x, a c
factor, partial fractions	a f, a a
polynomial quotient, remainder, GCD	a \, a %, a g
derivative, integral	a d, a i
taylor series	a t
principal solution to equation(s)	a S
list of solutions	a P
generic solution	H a S
apply function to both sides of eqn	a M
rewrite formula	a r

    Example: a r a*b + a*c := a*(b+c)
    Example: a r sin(x)^2 := 1-cos(x)^2
    Example: a r cos(n pi) := 1 :: integer(n) :: n%2 = 0
    Example: a r [f(0) := 1, f(n) := n f(n-1) :: n > 0]
    Put rules in EvalRules to have them apply automatically.
    Put rules in AlgSimpRules to apply during a s command.
    Common markers: opt, plain, quote, eval, let, remember.

Numerical Computations

sum formula over a range	a +
product of formula over a range	a *
tabulate formula over a range	a T
integrate numerically over a range	a I
find zero of formula or equation	a R
find local min, max of formula	a N, a X
fit data to line or curve	a F
mean of data in vector or variable	u M
median of data	H u M
geometric mean of data	u G
sum, product of data	u +, u *
minimum, maximum of data	u N, u X
sample, pop. standard deviation	u S, I u S

Selections

select subformula under cursor	j s
select nth subformula	j n
select more	j m
unselect this, all formulas	j u, j c
copy indicated subformula	j RET
delete indicated subformula	j DEL
commute selected terms	j C
commute term leftward, rightward	j L, j R
distribute, merge selection	j D, j M
isolate selected term in equation	j I
negate, invert term in context	j N, j &
rewrite selected term	j r

Graphics

graph function or data	g f
graph 3D function or data	g F
replot current graph	g p
print current graph	g P
add curve to graph	g a
set number of data points	g N
set line, point styles	g s, g S
set log vs. linear x, y axis	g l, g L
set range for x, y axis	g r, g R
close graphics window	g q

Programming

begin, end recording a macro	C-x (, C-x)
replay keyboard macro	X
read region as written-out macro	C-x * m
if, else, endif	Z [, Z :, Z]
equal to, less than, member of	a =, a <, a {
repeat n times, break from loop	Z <, Z >, Z /
"for" loop: start, end; body, step	Z (, Z)
save, restore mode settings	Z ', Z '
query user during macro	Z #
put finished macro on a key	Z K
define function with formula	Z F
edit definition	Z E
record user-defined command permanently	Z P
record variable value permanently	s p
record mode settings permanently	m m