Octave Quick Reference Octave Version 3.0.0

Starting Octave

octave	start interactive Octave session
octave *file*	run Octave on commands in *file*
octave --eval *code*	Evaluate *code* using Octave
octave --help	describe command line options

Stopping Octave

quit or exit	exit Octave
INTERRUPT	(*e.g.* C-c) terminate current command and return to top-level prompt

Getting Help

help	list all commands and built-in variables
help *command*	briefly describe *command*
doc	use Info to browse Octave manual
doc *command*	search for *command* in Octave manual
lookfor *str*	search for *command* based on *str*

Motion in Info

SPC or C-v	scroll forward one screenful
DEL or M-v	scroll backward one screenful
C-l	redraw the display

Node Selection in Info

n	select the next node
p	select the previous node
u	select the 'up' node
t	select the 'top' node
d	select the directory node
<	select the first node in the current file
>	select the last node in the current file
g	reads the name of a node and selects it
C-x k	kills the current node

Searching in Info

s	search for a string
C-s	search forward incrementally
C-r	search backward incrementally
i	search index & go to corresponding node
,	go to next match from last 'i' command

Command-Line Cursor Motion

C-b	move back one character
C-f	move forward one character
C-a	move to the start of the line
C-e	move to the end of the line
M-f	move forward a word
M-b	move backward a word
C-l	clear screen, reprinting current line at top

Inserting or Changing Text

M-TAB	insert a tab character
DEL	delete character to the left of the cursor
C-d	delete character under the cursor
C-v	add the next character verbatim
C-t	transpose characters at the point
M-t	transpose words at the point

[ ] surround optional arguments　　... show one or more arguments

Killing and Yanking

C-k	kill to the end of the line
C-y	yank the most recently killed text
M-d	kill to the end of the current word
M-DEL	kill the word behind the cursor
M-y	rotate the kill ring and yank the new top

Command Completion and History

TAB	complete a command or variable name
M-?	list possible completions
RET	enter the current line
C-p	move 'up' through the history list
C-n	move 'down' through the history list
M-<	move to the first line in the history
M->	move to the last line in the history
C-r	search backward in the history list
C-s	search forward in the history list
history [-q] [*N*]	list *N* previous history lines, omitting history numbers if -q
history -w [*file*]	write history to *file* (~/.octave_hist if no *file* argument)
history -r [*file*]	read history from *file* (~/.octave_hist if no *file* argument)
edit_history *lines*	edit and then run previous commands from the history list
run_history *lines*	run previous commands from the history list
[*beg*] [*end*]	Specify the first and last history commands to edit or run.

If *beg* is greater than *end*, reverse the list of commands before editing. If *end* is omitted, select commands from *beg* to the end of the history list. If both arguments are omitted, edit the previous item in the history list.

Shell Commands

cd *dir*	change working directory to *dir*
pwd	print working directory
ls [*options*]	print directory listing
getenv (*string*)	return value of named environment variable
system (*cmd*)	execute arbitrary shell command string

Matrices

Square brackets delimit literal matrices. Commas separate elements on the same row. Semicolons separate rows. Commas may be replaced by spaces, and semicolons may be replaced by one or more newlines. Elements of a matrix may be arbitrary expressions, assuming all the dimensions agree.

[*x, y, ...*]	enter a row vector
[*x; y; ...*]	enter a column vector
[*w, x; y, z*]	enter a 2×2 matrix

Multi-dimensional Arrays

Multi-dimensional arrays may be created with the *cat* or *reshape* commands from two-dimensional sub-matrices.

squeeze (*arr*)	remove singleton dimensions of the array.
ndims (*arr*)	number of dimensions in the array.
permute (*arr, p*)	permute the dimensions of an array.
ipermute (*arr, p*)	array inverse permutation.

shiftdim (*arr, s*) rotate the array dimensions.
circshift (*arr, s*) rotate the array elements.

Sparse Matrices

sparse (...)	create a sparse matrix.
speye (*n*)	create sparse identify matrix.
sprand (*n, m, d*)	sparse rand matrix of density *d*.
spdiags (...)	sparse generalization of *diag*.
nnz (*s*)	No. non-zero elements in sparse matrix.

Ranges

base : *limit*
base : *incr* : *limit*

Specify a range of values beginning with *base* with no elements greater than *limit*. If it is omitted, the default value of *incr* is 1. Negative increments are permitted.

Strings and Common Escape Sequences

A *string constant* consists of a sequence of characters enclosed in either double-quote or single-quote marks. Strings in double-quotes allow the use of the escape sequences below.

\\	a literal backslash
\"	a literal double-quote character
\'	a literal single-quote character
\n	newline, ASCII code 10
\t	horizontal tab, ASCII code 9

Index Expressions

var (*idx*)	select elements of a vector
var (*idx1, idx2*)	select elements of a matrix
scalar	select row (column) corresponding to *scalar*
vector	select rows (columns) corresponding to the elements of *vector*
range	select rows (columns) corresponding to the elements of *range*
:	select all rows (columns)

Global and Persistent Variables

global *var1* ...	Declare variables global.
global *var1* = *val*	Declare variable global. Set intial value.
persistent *var1*	Declare a variable as static to a function.
persistent *var1* = *val*	Declare a variable as static to a function and set its initial value.

Global variables may be accessed inside the body of a function without having to be passed in the function parameter list provided they are declared global when used.

Selected Built-in Functions

EDITOR	editor to use with edit_history
Inf, NaN	IEEE infinity, NaN
NA	Missing value
PAGER	program to use to paginate output
ans	last result not explicitly assigned
eps	machine precision
pi	π
1i	$\sqrt{-1}$
realmax	maximum representable value
realmin	minimum representable value

Assignment Expressions

var = *expr*	assign expression to variable
var (*idx*) = *expr*	assign expression to indexed variable
var (*idx*) = []	delete the indexed elements.
var {*idx*} = *expr*	assign elements of a cell array.

Arithmetic and Increment Operators

x + *y*	addition
x − *y*	subtraction
x * *y*	matrix multiplication
x .* *y*	element by element multiplication
x / *y*	right division, conceptually equivalent to (inverse (y') * x')'
x ./ *y*	element by element right division
x \ *y*	left division, conceptually equivalent to inverse (x) * y
x .\ *y*	element by element left division
x ^ *y*	power operator
x .^ *y*	element by element power operator
− *x*	negation
+ *x*	unary plus (a no-op)
x '	complex conjugate transpose
x .'	transpose
++ *x* (−− *x*)	increment (decrement), return *new* value
x ++ (*x* −−)	increment (decrement), return *old* value

Comparison and Boolean Operators

These operators work on an element-by-element basis. Both arguments are always evaluated.

x < *y*	true if *x* is less than *y*
x <= *y*	true if *x* is less than or equal to *y*
x == *y*	true if *x* is equal to *y*
x >= *y*	true if *x* is greater than or equal to *y*
x > *y*	true if *x* is greater than *y*
x != *y*	true if *x* is not equal to *y*
x & *y*	true if both *x* and *y* are true
x | *y*	true if at least one of *x* or *y* is true
! *bool*	true if *bool* is false

Short-circuit Boolean Operators

Operators evaluate left-to-right. Operands are only evaluated if necessary, stopping once overall truth value can be determined. Operands are converted to scalars using the **all** function.

x && *y*	true if both *x* and *y* are true
x || *y*	true if at least one of *x* or *y* is true

Operator Precedence

Table of Octave operators, in order of increasing precedence.

; ,	statement separators
=	assignment, groups left to right
|| &&	logical "or" and "and"
| &	element-wise "or" and "and"
< <= == >= > !=	relational operators
:	colon
+ −	addition and subtraction
* / \ .* ./ .\	multiplication and division
' .'	transpose
+ − ++ −− !	unary minus, increment, logical "not"
^ .^	exponentiation

Paths and Packages

path	display the current Octave cunction path.
pathdef	display the default path.
addpath(*dir*)	add a directory to the path.
EXEC_PATH	manipulate the Octave executable path.
pkg list	display installed packages.
pkg load *pack*	Load an installed package.

Cells and Structures

var.*field* = ...	set a field of a structure.
var{*idx*} = ...	set an element of a cell array.
cellfun(*f*, *c*)	apply a function to elements of cell array.
fieldnames(*s*)	returns the fields of a structure.

Statements

for *identifier* = *expr* *stmt-list* **endfor**
> Execute *stmt-list* once for each column of *expr*. The variable *identifier* is set to the value of the current column during each iteration.

while (*condition*) *stmt-list* **endwhile**
> Execute *stmt-list* while *condition* is true.

break	exit innermost loop
continue	go to beginning of innermost loop
return	return to calling function

if (*condition*) *if-body* [**else** *else-body*] **endif**
> Execute *if-body* if *condition* is true, otherwise execute *else-body*.

if (*condition*) *if-body* [**elseif** (*condition*) *elseif-body*] **endif**
> Execute *if-body* if *condition* is true, otherwise execute the *elseif-body* corresponding to the first **elseif** condition that is true, otherwise execute *else-body*.
> Any number of **elseif** clauses may appear in an **if** statement.

unwind_protect *body* **unwind_protect_cleanup** *cleanup* **end**
> Execute *body*. Execute *cleanup* no matter how control exits *body*.

try *body* **catch** *cleanup* **end**
> Execute *body*. Execute *cleanup* if *body* fails.

Strings

strcmp (*s*, *t*)	compare strings
strcat (*s*, *t*, ...)	concatenate strings
regexp (*str*, *pat*)	strings matching regular expression
regexprep (*str*, *pat*, *rep*)	Match and replace sub-strings

Defining Functions

function [*ret-list*] *function-name* [(*arg-list*)]
> *function-body*

endfunction

ret-list may be a single identifier or a comma-separated list of identifiers delimited by square-brackets.

arg-list is a comma-separated list of identifiers and may be empty.

Function Handles

@*func*	Define a function handle to *func*.
@(*var1*, ...) *expr*	Define an anonymous function handle.
str2func (*str*)	Create a function handle from a string.
functions (*handle*)	Return information about a function handle.
func2str (*handle*)	Return a string representation of a function handle.
handle (*arg1*, ...)	Evaluate a function handle.
feval (*func*, *arg1*, ...)	Evaluate a function handle or string, passing remaining args to *func*

Anonymous function handles take a copy of the variables in the current workspace.

Miscellaneous Functions

eval (*str*)	evaluate *str* as a command
error (*message*)	print message and return to top level
warning (*message*)	print a warning message
clear *pattern*	clear variables matching pattern
exist (*str*)	check existence of variable or function
who, whos	list current variables
whos *var*	details of the varibale *var*

Basic Matrix Manipulations

rows (*a*)	return number of rows of *a*
columns (*a*)	return number of columns of *a*
all (*a*)	check if all elements of *a* nonzero
any (*a*)	check if any elements of *a* nonzero
find (*a*)	return indices of nonzero elements
sort (*a*)	order elements in each column of *a*
sum (*a*)	sum elements in columns of *a*
prod (*a*)	product of elements in columns of *a*
min (*args*)	find minimum values
max (*args*)	find maximum values
rem (*x*, *y*)	find remainder of x/y
reshape (*a*, *m*, *n*)	reformat *a* to be *m* by *n*
diag (*v*, *k*)	create diagonal matrices
linspace (*b*, *l*, *n*)	create vector of linearly-spaced elements
logspace (*b*, *l*, *n*)	create vector of log-spaced elements
eye (*n*, *m*)	create *n* by *m* identity matrix
ones (*n*, *m*)	create *n* by *m* matrix of ones
zeros (*n*, *m*)	create *n* by *m* matrix of zeros
rand (*n*, *m*)	create *n* by *m* matrix of random values

Linear Algebra

chol (*a*)	Cholesky factorization
det (*a*)	compute the determinant of a matrix
eig (*a*)	eigenvalues and eigenvectors
expm (*a*)	compute the exponential of a matrix
hess (*a*)	compute Hessenberg decomposition
inverse (*a*)	invert a square matrix
norm (*a*, *p*)	compute the *p*-norm of a matrix
pinv (*a*)	compute pseudoinverse of *a*
qr (*a*)	compute the QR factorization of a matrix
rank (*a*)	matrix rank
sprank (*a*)	structrual matrix rank
schur (*a*)	Schur decomposition of a matrix
svd (*a*)	singular value decomposition
syl (*a*, *b*, *c*)	solve the Sylvester equation

Equations, ODEs, DAEs, Quadrature

*fsolve	solve nonlinear algebraic equations
*lsode	integrate nonlinear ODEs
*dassl	integrate nonlinear DAEs
*quad	integrate nonlinear functions
perror (nm, $code$)	for functions that return numeric codes, print error message for named function and given error code

* See the on-line or printed manual for the complete list of arguments for these functions.

Signal Processing

fft (a)	Fast Fourier Transform using FFTW
ifft (a)	inverse FFT using FFTW
freqz ($args$)	FIR filter frequency response
filter (a, b, x)	filter by transfer function
conv (a, b)	convolve two vectors
hamming (n)	return Hamming window coefficents
hanning (n)	return Hanning window coefficents

Image Processing

colormap (map)	set the current colormap
gray2ind (i, n)	convert gray scale to Octave image
image (img, $zoom$)	display an Octave image matrix
imagesc (img, $zoom$)	display scaled matrix as image
imshow (img, map)	display Octave image
imshow (i, n)	display gray scale image
imshow (r, g, b)	display RGB image
ind2gray (img, map)	convert Octave image to gray scale
ind2rgb (img, map)	convert indexed image to RGB
loadimage ($file$)	load an image file
rgb2ind (r, g, b)	convert RGB to Octave image
saveimage ($file$, img, fmt, map)	save a matrix to $file$

C-style Input and Output

fopen ($name$, $mode$)	open file $name$
fclose ($file$)	close $file$
printf (fmt, ...)	formatted output to stdout
fprintf ($file$, fmt, ...)	formatted output to $file$
sprintf (fmt, ...)	formatted output to string
scanf (fmt)	formatted input from stdin
fscanf ($file$, fmt)	formatted input from $file$
sscanf (str, fmt)	formatted input from $string$
fgets ($file$, len)	read len characters from $file$
fflush ($file$)	flush pending output to $file$
ftell ($file$)	return file pointer position
frewind ($file$)	move file pointer to beginning
freport	print a info for open files
fread ($file$, $size$, $prec$)	read binary data files
fwrite ($file$, $size$, $prec$)	write binary data files
feof ($file$)	determine if pointer is at EOF

A file may be referenced either by name or by the number returned from **fopen**. Three files are preconnected when Octave starts: **stdin**, **stdout**, and **stderr**.

Other Input and Output functions

save $file$ var ...	save variables in $file$
load $file$	load variables from $file$
disp (var)	display value of var to screen

Polynomials

compan (p)	companion matrix
conv (a, b)	convolution
deconv (a, b)	deconvolve two vectors
poly (a)	create polynomial from a matrix
polyderiv (p)	derivative of polynomial
polyreduce (p)	integral of polynomial
polyval (p, x)	value of polynomial at x
polyvalm (p, x)	value of polynomial at x
roots (p)	polynomial roots
residue (a, b)	partial fraction expansion of ratio a/b

Statistics

corrcoef (x, y)	correlation coefficient
cov (x, y)	covariance
mean (a)	mean value
median (a)	median value
std (a)	standard deviation
var (a)	variance

Plotting Functions

plot ($args$)	2D plot with linear axes
plot3 ($args$)	3D plot with linear axes
line ($args$)	2D or 3D line
patch ($args$)	2D patch
semilogx ($args$)	2D plot with logarithmic x-axis
semilogy ($args$)	2D plot with logarithmic y-axis
loglog ($args$)	2D plot with logarithmic axes
bar ($args$)	plot bar charts
stairs (x, y)	plot stairsteps
stem (x, it y)	plot a stem graph
hist (y, x)	plot histograms
contour (x, y, z)	contour plot
title ($string$)	set plot title
axis ($limits$)	set axis ranges
xlabel ($string$)	set x-axis label
ylabel ($string$)	set y-axis label
zlabel ($string$)	set z-axis label
text (x, y, str)	add text to a plot
legend ($string$)	set label in plot key
grid [on|off]	set grid state
hold [on|off]	set hold state
ishold	return 1 if hold is on, 0 otherwise
mesh (x, y, z)	plot 3D surface
meshgrid (x, y)	create mesh coordinate matrices