Octave Quick Reference Octave Version 3.0.0

Starting Octave

octave start interactive Octave session octave filerun 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-1 redraw the display

Node Selection in Info

select the next node select the previous node р select the 'up' node select the 'top' node select the directory node

select the first node in the current file select the last node in the current file reads the name of a node and selects it

C-x k kills the current node

Searching in Info

search for a string

C-s search forward incrementally search backward incrementally

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-fmove forward a word M-b move backward a word

C-1clear 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-DEI. kill the word behind the cursor M-y rotate the kill ring and vank 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 $\left[-\mathrm{q} \right] \left[N \right]$	list N previous history lines, omitting history numbers if $-\mathbf{q}$	
history -w $[file]$	write history to file (~/.octave_hist if no file argument)	
$\verb history -r [file] $	<pre>read history from file (~/.octave_hist if no file argument)</pre>	
${\tt edit_history}\ lines$	edit and then run previous commands	
	from the history list	
1 1 1 1	1 6 11 11 1	

run_history lines run previous commands from the history

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.

 $[x, y, \dots]$ enter a row vector $[x; y; \dots]$ 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 identity 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 doublequotes allow the use of the escape sequences below.

11 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

vector

var (idx) select elements of a vector var (idx1, idx2)select elements of a matrix

scalarselect row (column) corresponding to scalar

select rows (columns) corresponding to the

elements of vector select rows (columns) corresponding to the range

elements of range select all rows (columns)

Global and Persistent Variables

global var1 ... Declare variables global.

global var1 = val Declare variable global. Set initial value. persistent var1 Declare a variable as static to a function. persistent var1 = 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 last result not explicitly assigned ans

machine precision eps

рi π

 $\sqrt{-1}$ 1i realmax maximum representable value realmin minimum representable value

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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')'
$x \cdot / y$	element by element right division
$x \setminus y$	left division, conceptually equivalent to
	inverse (x) * y
$x \cdot y$	element by element left division
$x \hat{y}$	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 \le y
                     true if x is less than or equal to y
x == y
                     true if x is equal to y
x \ge y
                     true if x is greater than or equal to y
                     true if x is greater than y
x > u
x != y
                     true if x is not equal to y
x & y
                     true if both x and y are true
x \mid 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.

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 function 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.
${ t pkg load}\ pack$	Load an installed package.
addpath(dir) EXEC_PATH pkg list	add a directory to the path. manipulate the Octave executable path. display installed packages.

Cells and Structures

$var.field = \dots$	set a field of a structure.
$var\{idx\} = \dots$	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	$_{ m exit}$	inne	rm	ost	loop

continue go to beginning of innermost loop

return to calling function

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

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

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

Qfunc	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

whos var

eval (str)	evaluate str as a command
error (message)	print message and return to top level
warning (message)	print a warning message
${\tt clear}\ pattern$	clear variables matching pattern
exist (str)	check existence of variable or function
who, whos	list current variables

details of the variable var

Basic Matrix Manipulations

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)	structural 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

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 coefficients
hanning (n)	return Hanning window coefficients

Image Processing

${ t colormap}$ (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
imread (file)	load an image file
imshow (img , map)	display Octave image
imshow (i, n)	display gray scale image
imshow (r, g, b)	display RGB image
imwrite (img , $file$)	write images in various file formats
ind2gray (img, map)	convert Octave image to gray scale
ind2rgb (img, map)	convert indexed image to RGB
rgb2ind (r, g, b)	convert RGB to Octave image
save a matrix to $file$	

C-style Input and Output

1	- I
fopen (name, mode)	open file name
fclose (file)	close file
<pre>printf (fmt,)</pre>	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 fileload fileload variables from filedisp (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

Plotting Functions		
plot (args)	2D plot with linear axes	
plot3 (args)	3D plot with linear axes	
line (args)	2D or 3D line	
\mathtt{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, 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	

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