

# MATLAB QUICK REFERENCE

## GETTING STARTED

<code>edit prog</code>	Starts MATLAB Editor/Debugger; may add the optional argument <i>prog</i> , to open a specific program (omit program's .m extension).
<code>simulink</code>	Starts SIMULINK with new model.
<code>ee2311</code>	Opens the SIMULINK EE 2311 Blockset.

## HELP COMMANDS

<code>helpwin</code>	Starts MATLAB Help Window.
<code>helpdesk</code>	Starts MATLAB Help Desk (HTML).
<code>help cmd</code>	Runs help file description for the Matlab function <i>cmd</i> .
<code>demo</code>	Starts MATLAB Demo Window.

## PLOTTING COMMANDS

<code>plot(x<sub>1</sub>,y<sub>1</sub>,x<sub>2</sub>,y<sub>2</sub>,...,options)</code>	Graphs the values in vector <i>y<sub>n</sub></i> versus the values in vector <i>x<sub>n</sub></i> , onto two linear axes (as many pairs of vectors can be plotted as is desired).
<code>semilogx(...)</code>	Same as <code>plot</code> , but graphs values onto a logarithmic x-axis and linear y-axis.
<code>semilogy(...)</code>	Same as <code>plot</code> , but graphs values onto a linear x-axis and logarithmic y-axis.
<code>loglog(...)</code>	Same as <code>plot</code> , but graphs values onto two logarithmic axes.
<code>subplot(rows,cols,plot_num)</code>	Creates a <i>rows</i> by <i>cols</i> arrangement of graphs on a single figure; would be used directly before plotting the <i>plot_num</i> -th graph.
<code>axis([x<sub>min</sub> x<sub>max</sub> y<sub>min</sub> y<sub>max</sub>])</code>	Re-sizes the axes of the current figure to the given x and y ranges.
<code>xlabel(str)</code>	Draws a label for the x-axis of the current figure, using the string <i>str</i> .
<code>ylabel(str)</code>	Draws a label for the y-axis of the current figure, using the string <i>str</i> .
<code>title(str)</code>	Draws a title for the current figure, using the string <i>str</i> .
<code>grid</code>	Toggles the grid on or off for the current figure.
<code>hold</code>	Toggles the hold for the current figure (when hold is on, new plotting commands are added to the current figure; when off, new plotting commands erase the current figure and write over it).

## BASIC HOUSEKEEPING COMMANDS

<code>clc</code>	Clears MATLAB Command Window; returns cursor to upper right.
<code>clf</code>	Clears current figure (current figure can be changed with the command <code>figure</code> ).
<code>figure(fig)</code>	Creates or selects figure specified by <i>fig</i> ; figure becomes the current figure for commands such as <code>clf</code> and <code>plot</code> .
<code>format type</code>	Changes number output format to <i>type</i> (such as <code>short</code> or <code>long</code> ).
<code>workspace</code>	Starts MATLAB Workspace Browser.
<code>clear(var)</code>	Removes variable <i>var</i> from memory; returns pre-set variables (such as <code>pi</code> ) to their original values; use without argument clears all workspace variables.
<code>who</code>	Lists all variable names currently in memory.
<code>editpath</code>	Starts MATLAB Path Browser.
<code>cd x:\dir</code>	Changes current working directory to directory <i>dir</i> on drive <i>x</i> .
<code>addpath pathstr</code>	Adds to the path the directory specified by <i>pathstr</i> (be sure to enclose the path in single quote marks, to make it a string).

## GENERAL COMMANDS AND OPERATORS

<code>%</code>	Tells MATLAB to ignore the rest of the line; used for commenting.
<code>...</code>	Tells MATLAB that the current command is continued on the next line; can be used anywhere in a command, except in the middle of a function or variable name.
<code>[ ]</code>	Used to create a vector or matrix; within the brackets, values within a row are separated by spaces or commas, and rows are separated by semicolons.
<code>;</code>	Suppresses the display of the output of a MATLAB operation; also starts a new row in a vector or matrix declaration (when using the square brackets).
<code>=</code>	Stores values to the workspace; saves the result of any MATLAB operation under the variable name preceding it.
<code>pi</code>	The constant $\pi \approx 3.1415926535897$ .
<code>a:n:c</code>	Creates a vector of values beginning with <i>a</i> and counting by <i>n</i> up to <i>c</i> .
<code>linspace(a,b,pts)</code>	Creates a vector of values ranging from <i>a</i> to <i>b</i> , and containing <i>pts</i> number of values.
<code>logspace(a,b,pts)</code>	Creates a logarithmically scaled vector of values, ranging from $10^a$ to $10^b$ , and containing <i>pts</i> number of values.

## LOGIC AND RELATIONAL OPERATORS

<code>==</code>	Equal to; used to compare scalars or identically-sized pairs of matrices or vectors; returns 1 if statement of equality is true, and 0 if false.
<code>~=</code>	Not equal to.
<code>&lt;</code>	Less than.
<code>&lt;=</code>	Less than or equal to.
<code>&gt;</code>	Greater than.
<code>&gt;=</code>	Greater than or equal to.
<code>&amp;</code>	Logical AND; returns 1 if AND operation is true, and 0 if false.
<code> </code>	Logical OR.
<code>~</code>	Logical NOT; returns the logical opposite of the elements of $\mathbf{x}$ .

## ARITHMETIC OPERATORS

<code>+</code>	Addition; used to add two scalars, two vectors, or a scalar to a vector.
<code>-</code>	Subtraction; follows rules of addition.
<code>*</code>	Matrix multiplication; can be used to multiply two scalars, or a scalar and a vector.
<code>.*</code>	Array or element-by-element multiplication; used to multiply the elements of a vector by the elements of another vector.
<code>^</code>	Matrix power; can be used to raise a scalar to a scalar exponent.
<code>.^</code>	Array or element-by-element power; used to raise the elements of a vector to a scalar exponent, or to a vector of exponents.
<code>/</code>	Matrix division; can be used to divide two scalars, or a vector by a scalar.
<code>./</code>	Array or element-by-element division; used to divide the elements of a vector by the elements of another vector, or to divide a scalar by a vector.

## COMMON LOOP FUNCTIONS

<code>if <math>\mathbf{x}</math></code>	Used to execute successive statements based on the logical value of $\mathbf{x}$ .
<code>else</code>	Used to execute statements contrary to if condition.
<code>elseif <math>\mathbf{x}</math></code>	Same as <code>else</code> , but allows for an extra logical condition.
<code>for <math>n=a:b</math></code>	Used to construct a definite loop; will repeat as $n$ counts up from $a$ to $b$ .
<code>while(<math>\mathbf{x}</math>)</code>	Used to construct an indefinite loop; will repeat as long as $\mathbf{x}$ remains true.
<code>end</code>	Delimits the scope of an <code>if</code> , <code>for</code> , or <code>while</code> construction.
<code>break</code>	Terminates execution of current loop.

## COMMON TRIGONOMETRIC FUNCTIONS

<code>sin(<math>\mathbf{x}</math>)</code>	Returns the sine of the elements of $\mathbf{x}$ .
<code>asin(<math>\mathbf{x}</math>)</code>	Returns the arcsine (inverse sine) of the elements of $\mathbf{x}$ .
<code>cos(<math>\mathbf{x}</math>)</code>	Returns the cosine of the elements of $\mathbf{x}$ .
<code>acos(<math>\mathbf{x}</math>)</code>	Returns the arccosine (inverse cosine) of the elements of $\mathbf{x}$ .
<code>tan(<math>\mathbf{x}</math>)</code>	Returns the tangent of the elements of $\mathbf{x}$ .
<code>atan(<math>\mathbf{x}</math>)</code>	Returns the arctangent (inverse tangent) of the elements of $\mathbf{x}$ .

## COMMON EXPONENTIAL AND LOGARITHMIC FUNCTIONS

<code>exp(<math>\mathbf{x}</math>)</code>	Returns the exponential ( $e^x$ ) of the elements of $\mathbf{x}$ .
<code>log(<math>\mathbf{x}</math>)</code>	Returns the natural logarithm ( $\ln x$ ) of the elements of $\mathbf{x}$ .
<code>log2(<math>\mathbf{x}</math>)</code>	Returns the base-2 logarithm ( $\log_2 x$ ) of the elements of $\mathbf{x}$ .
<code>log10(<math>\mathbf{x}</math>)</code>	Returns the common logarithm ( $\log_{10} x$ ) of the elements of $\mathbf{x}$ .
<code>sqrt(<math>\mathbf{x}</math>)</code>	Returns the square root ( $\sqrt{x}$ ) of the elements of $\mathbf{x}$ .

## COMMON COMPLEX NUMBER FUNCTIONS

<code>i</code>	Returns the basic imaginary unit ( $\sqrt{-1}$ ); <code>j</code> may also be used.
<code>abs(<math>\mathbf{x}</math>)</code>	Returns the absolute value or complex magnitude of the elements of $\mathbf{x}$ .
<code>angle(<math>\mathbf{x}</math>)</code>	Returns the complex phase of the elements of $\mathbf{x}$ .
<code>real(<math>\mathbf{x}</math>)</code>	Returns the real part of the of the elements of $\mathbf{x}$ .
<code>imag(<math>\mathbf{x}</math>)</code>	Returns the imaginary part of the of the elements of $\mathbf{x}$ .
<code>conj(<math>\mathbf{x}</math>)</code>	Returns the complex conjugate of the elements of $\mathbf{x}$ .

## COMMON ROUNDING AND REMAINDER FUNCTIONS

<code>round(<math>\mathbf{x}</math>)</code>	Rounds the elements of $\mathbf{x}$ towards the nearest integer.
<code>ceil(<math>\mathbf{x}</math>)</code>	Rounds the elements of $\mathbf{x}$ towards $\infty$ .
<code>floor(<math>\mathbf{x}</math>)</code>	Rounds the elements of $\mathbf{x}$ towards $-\infty$ .
<code>fix(<math>\mathbf{x}</math>)</code>	Rounds the elements of $\mathbf{x}$ towards zero.
<code>rem(<math>\mathbf{x}, \mathbf{y}</math>)</code>	Returns the unsigned remainder of the division of the elements of $\mathbf{x}$ by the elements of $\mathbf{y}$ .
<code>signum(<math>\mathbf{x}</math>)</code>	Returns 1, 0, and $-1$ for the corresponding positive, zero, and negative elements of $\mathbf{x}$ .