# Matlab Reference Sheet

## General Syntax

Variable names – string of characters without spaces, cannot begin with numbers
% - Comments in code proceed with a %

| | |
|---|---|
| + | addition |
| - | subtraction |
| * | multiplication of a matrix |
| / | division of a matrix |
| ^ | raising to a power, for an matrix |
| .* | element-by-element multiplication |
| ./ | element-by-element division |
| .^ | raising each element to a power |
| log | natural log |
| log10 | log base ten |
| exp(variable) | $e^{variable}$ |

| | |
|---|---|
| ; | ends a line, and the output of the line is not returned to the screen |
| [] | used to define an array of numbers |

| | | | | |
|---|---|---|---|---|
| 'b' | blue | '.' | point |
| 'k' | black | 'o' | circle |
| 'r' | red | 'x' | x-mark |
| 'c' | cyan | '+' | plus |
| 'g' | green | '*' | star |
| 'm' | magenta | 's' | square |
| 'y' | yellow | 'd' | diamond |
| | | 'v' | triangle (down) |
| '- ' | solid | '^' | triangle (up) |
| ':' | dotted | '<' | triangle (left) |
| '-'. | dashdot | '>' | triangle (right) |
| '--' | dashed | 'p' | pentagram |
| | | 'h' | hexagram |

| | |
|---|---|
| [x:step:y] | Creates an array from [x x+step x+step+step … y-step y] |
| M(row, column) | The notation for the index of a given value in matrix M |
| M(:,column) | Selects all rows of a given column of matrix M |
| M(row,:) | Selects all columns of a given row of matrix M |

**Helpful Functions**

Specific syntax associated with each of the functions listed below can be found in the example code displayed at the end of the help entry.  To access the help entry, simply type "help function_name" in the command window and hit enter.  The example code is normally at the end of the entry.

| | |
|---|---|
| close | Closes figure windows |
| clear | Clears variables from the workspace |
| | |
| linspace | Creates a linearly space series of values between two defined end points |
| logspace | Creates a log spaced series of values between two defined end points |
| | |
| std | Standard Deviation |
| mean | Mean |
| var | Variance |
| abs | Absolute value |
| min | Finds the minimum element of an array |
| max | Finds the maximum element of an array |
| sort | Puts elements of an array in ascending order |
| | |
| zeros | Generates a matrix of a given dimension with all zero entries |
| ones | Generates a matrix of a given dimension with all one entries |
| ^-1 | Finds the inverse of a matrix |
| ' | Transpose the matrix |
| dot | Calculates the dot product of two arrays |
| size | dimensionality of a matrix |
| length | length of a vector |
| | |
| sum | Sum the elements of an array |
| prod | Product of the elements of an array |
| diff | Difference between consecutive entries in an array |
| | |
| for | For loop |
| while | While loop |
| if | If statements |
| | |
| nlinfit | Nonlinear fitting algorithm |
| fsolve | It solves nonlinear equations of the form F(x)=0, via least squares |
| | |
| plot | 2D plot of two arrays of data |
| semilogx | 2D plot with a log scale on the x-axis |
| semilogy | 2D plot with a log scale on the y-axis |
| loglog | 2D plot with a log scale on both axes |
| bar | 2D bar graph |
| hist | 2D histogram |

| | |
|---|---|
| surf | 3D graph meant for data sets that generate a surfaces |
| mesh | 3D graph meant for data sets that generate a surface, displayed as a mesh |
| bar3 | 3D bar graph |
| plot3 | 3D graph for lines or points in space |

| | |
|---|---|
| text | Allows you to place text at a specific location on the graph |
| gtext | Allows you to place text freely on the graph |
| xlabel | Allows you to indicate the notation on the x-axis |
| ylabel | Allows you to indicate the notation on the y-axis |
| title | Allows you to put a title at the head of the figure |
| legend | Useful with multiple datasets to distinguish between them |

| | |
|---|---|
| hold on | Allows multiple data sets to be plotted on a single figure |
| figure(1) | Allows you to designate the figure on which you want data plotted |

Other elements of the graph can be manipulated directly in the figure window preferences.  Ideally, however it is better to not manipulate the graph in post production, because if the graph has to be plotted again, the changes will be lost.

| | |
|---|---|
| dlmread | import data from an ASCII-delimited file |
| textread | import data from a textfile in a certain format |
| load filename | import data from an ASCII-delimited file |

| | |
|---|---|
| tic toc | Placing code between the two words will turn on and off a timer and the computing time required to run the code will be printed in the command window. |
| who | list all variables currently used |
| save | Allows you to save variables to a specific file. |
| print –despc filename.ps | To print an active plot |
| lpr on athena | To print a .eps figure file you have exported from MATLAB |