

## Summary of MATLAB Onramp

## Basic Syntax

Example	Description
<code>x = pi</code>	Create variables and assign values with the equal sign (=). The left side (x) is the variable name, and the right side (pi) is its value.
<code>y = sin(-5)</code>	Provide inputs to a function using parentheses.

## Desktop Management

Function	Example	Description
<code>save</code>	<code>save data.mat</code>	Save your current workspace to a MAT-file.
<code>load</code>	<code>load data.mat</code>	Load the variables in a MAT-file to the workspace.
<code>clear</code>	<code>clear</code>	Clear all variables from the workspace.
<code>clc</code>	<code>clc</code>	Clear all text from the Command Window.
<code>format</code>	<code>format long</code>	Change how numeric output appears in the Command Window.

## Array Types

Example	Description
<code>4</code>	scalar
<code>[3 5]</code>	row vector
<code>[1;3]</code>	column vector
<code>[3 4 5; 6 7 8]</code>	matrix

## Evenly Spaced Vectors

Example	Description
<code>1:4</code>	Create a vector from 1 to 4, spaced by 1, using the <u>colon operator</u> (:).
<code>1:0.5:4</code>	Create a vector from 1 to 4, spaced by 0.5.
<code>linspace(1,10,5)</code>	Create a vector with 5 elements. The values are evenly spaced from 1 to 10.

## Matrix Creation

Example	Description
<code>rand(2)</code>	Create a square matrix with 2 rows and 2 columns.
<code>zeros(2,3)</code>	Create a rectangular matrix with 2 rows and 3 columns of 0s.
<code>ones(2,3)</code>	Create a rectangular matrix with 2 rows and 3 columns of 1s.

## Array Indexing

Example	Description
<code>A(end,2)</code>	Access the element in the second column of the last row.
<code>A(2,:)</code>	Access the entire second row.
<code>A(1:3,:)</code>	Access all columns of the first three rows.
<code>A(2) = 11</code>	Change the value of the second element of an array to 11.

## Array Operations

Example	Description
<pre>[1 2; 3 4] + 1 ans =      2     3      4     5</pre>	Perform <u>array addition</u> .
<pre>[1 1; 1 1]*[2 2; 2 2] ans =      4     4      4     4</pre>	Perform <u>matrix multiplication</u> .
<pre>[1 1; 1 1].*[2 2; 2 2] ans =      2     2      2     2</pre>	Perform <u>element-wise multiplication</u> .

## Multiple Outputs

Example	Description
<code>[xrow,xcol] = <u>size</u>(x)</code>	Save the number of rows and columns in <code>x</code> to two different variables.
<code>[xMax,idx] = <u>max</u>(x)</code>	Calculate the maximum value of <code>x</code> and its corresponding index value.

## Documentation

Example	Description
<code><u>doc</u> randi</code>	Open the documentation page for the <code>randi</code> function.

## Plots

Example	Description
<code><u>plot</u>(x,y,"ro--",LineWidth=5)</code>	Plot a red (r) dashed (--) line with a circle (o) marker, with a heavy line width.
<code><u>hold</u> on</code>	Add the next line to the existing plot.
<code>hold off</code>	Create new axes for the next plotted line.
<code><u>title</u>("My Title")</code>	Add a title to a plot.
<code><u>xlabel</u>("x")</code> <code><u>ylabel</u>("y")</code>	Add labels to axes.
<code><u>legend</u>("a","b","c")</code>	Add a legend to a plot.

## Tables

Example	Description
<code><u>data.HeightYards</u></code>	Extract the variable <code>HeightYards</code> from the table <code>data</code> .
<code>data.HeightMeters = data.HeightYards*0.9144</code>	Derive a table variable from existing data.

**Logical indexing**

Example	Description
<code>[5 10 15] &gt; 12</code>	Compare the elements of a vector to the value 12.
<code>v1(v1 &gt; 6)</code>	Extract all elements of v1 that are greater than 6.
<code>x(x==999) = 1</code>	Replace all values in x that are equal to 999 with the value 1.

**Programming**

Example	Description
<pre>if x &gt; 0.5     y = 3 else     y = 4 end</pre>	<p>If x is greater than 0.5, set y to 3.</p> <p>Otherwise, set y to 4.</p>
<pre>for c = 1:3     disp(c) end</pre>	<p>The loop counter (c) progresses through the values 1:3 (1, 2, and 3).</p> <p>The loop body displays each value of c.</p>