



Basic Plotting Function

MATLAB has extensive facilities for displaying vectors and matrices as graphs, as well as annotating and printing these graphs.

Creating a Plot Using Plot Function

Plotting a function in MATLAB involves the following:

1. Define the function.
2. Specify the range of values over which to plot function.

The interval is defined as **[start : interval : end]**.

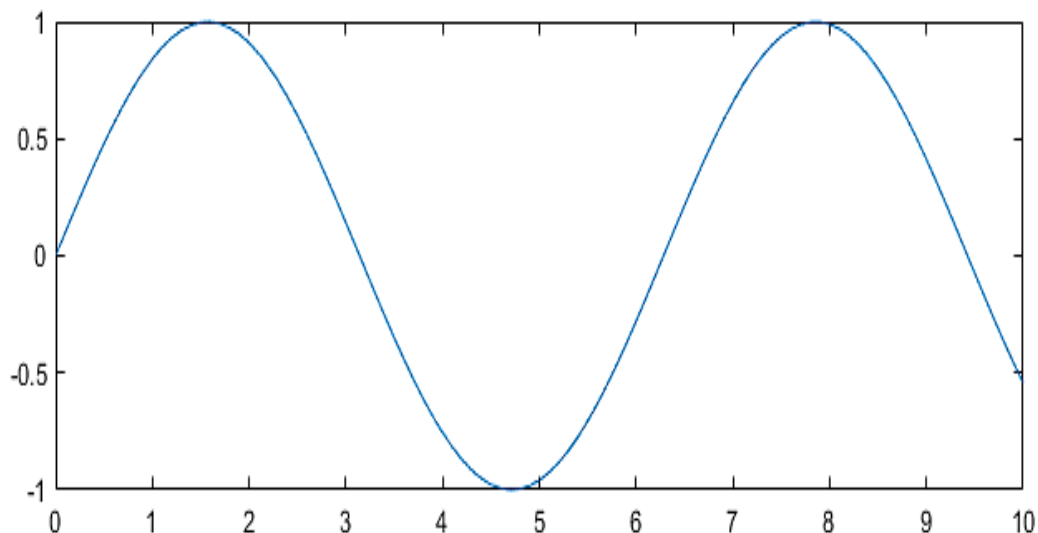
3. Call MATLAB function **plot (x,y)**.

For example:

```
>> x = 0 : 0.1 : 10 ;
```

```
>>y = sin(x) ;
```

```
>>plot (x , y)
```





Specifying Line Styles and Colors

Various line types, plot symbols and colors may be obtained with **plot(x,y,s)** where s is a character string made from one element from any or all the following 3 columns:

Table 1 MATLAB specifiers for plot colors

Specifier	Color
y	yellow
m	magenta
c	cyan
r	red
g	green
b	blue
w	white
k	black



Table 2 MATLAB specifiers for plot Marker

Specifier	Marker	Specifier	Marker
o	Circle	d	Diamond
+	Plus sign	^	Upward-pointing triangle
*	Asterisk	v	Downward-pointing triangle
.	Point	>	Right-pointing triangle
x	Cross	<	Left-pointing triangle
s	Square	p	Pentagram
— or 	Horizontal or vertical line	h	Hexagram

Line style, specified as one of the options listed in this table.

plot (x,y,'style_color_marker') where style_color_marker is a triplet of values from **Table 1 , 2 , 3**.



Table 3 MATLAB specifiers for Line style

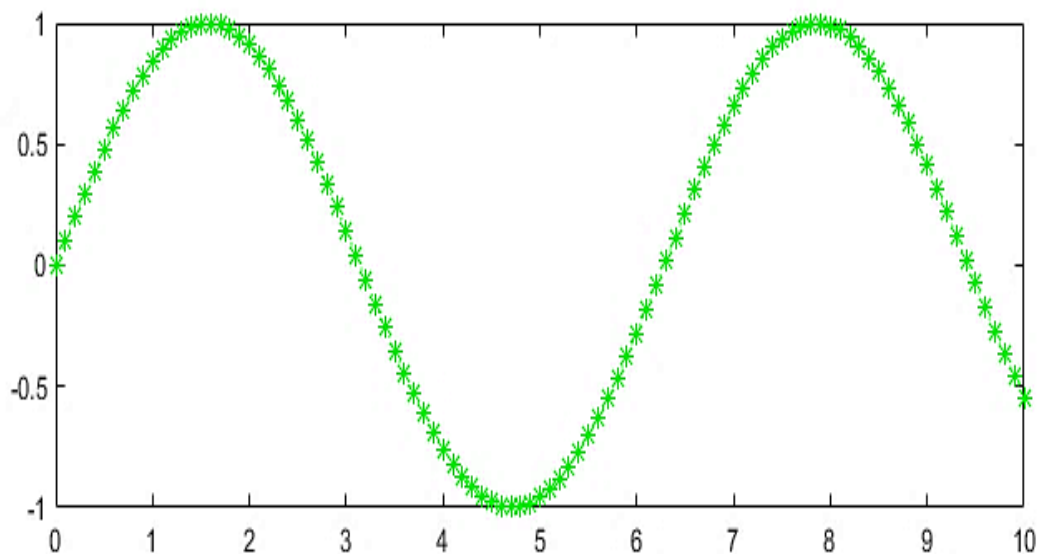
Specifier	Line Style
-	Solid line (default)
--	Dashed line
:	Dotted line
-.	Dash-dot line

For example:

```
>> x = 0:0.1:10;
```

```
>> y = sin(x);
```

```
>> plot( x , y , '.*g' )
```





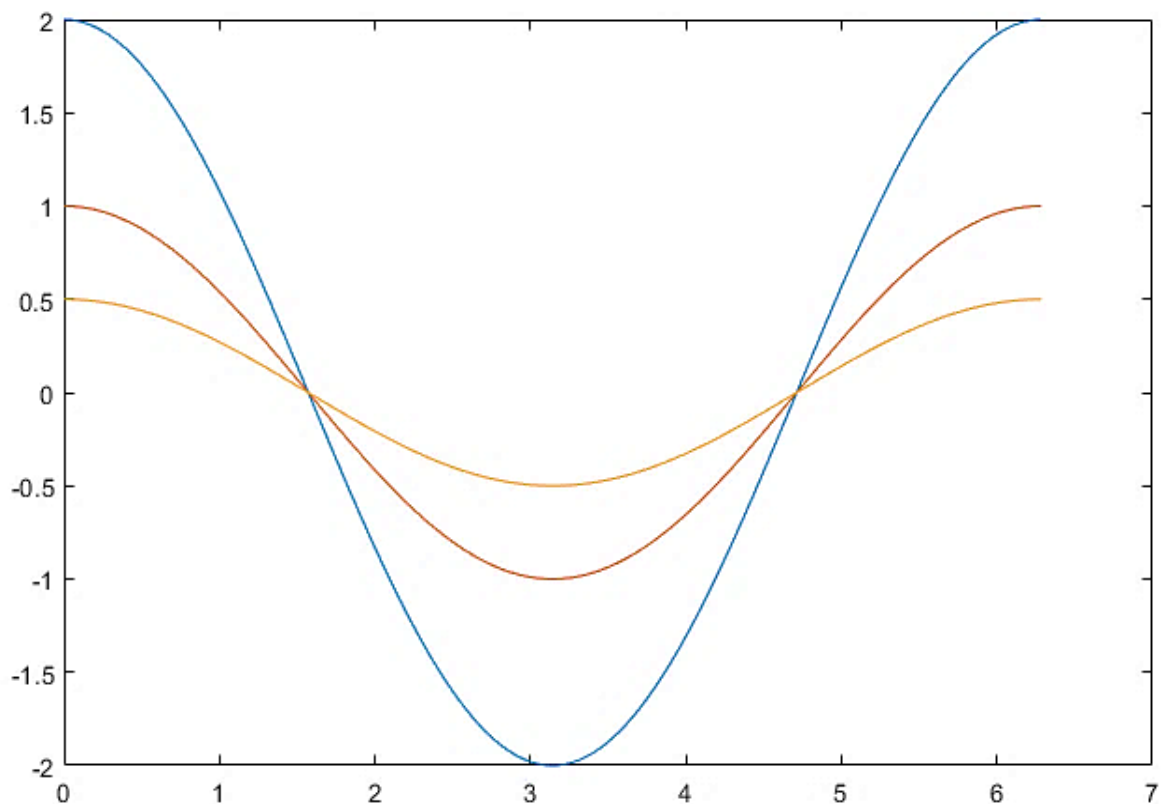
Multiple Data Sets in One Graph

MATLAB automatically cycles through a predefined (but user settable) list of colors to allow discrimination among sets of data.

Plots multiple X, Y pairs using the same axes for all lines.

For example:

```
>> x = 0:pi/100:2*pi;  
>> y1 = 2*cos(x);  
>> y2 = cos(x);  
>> y3 = 0.5*cos(x);  
>> plot(x,y1,x,y2,x,y3)
```

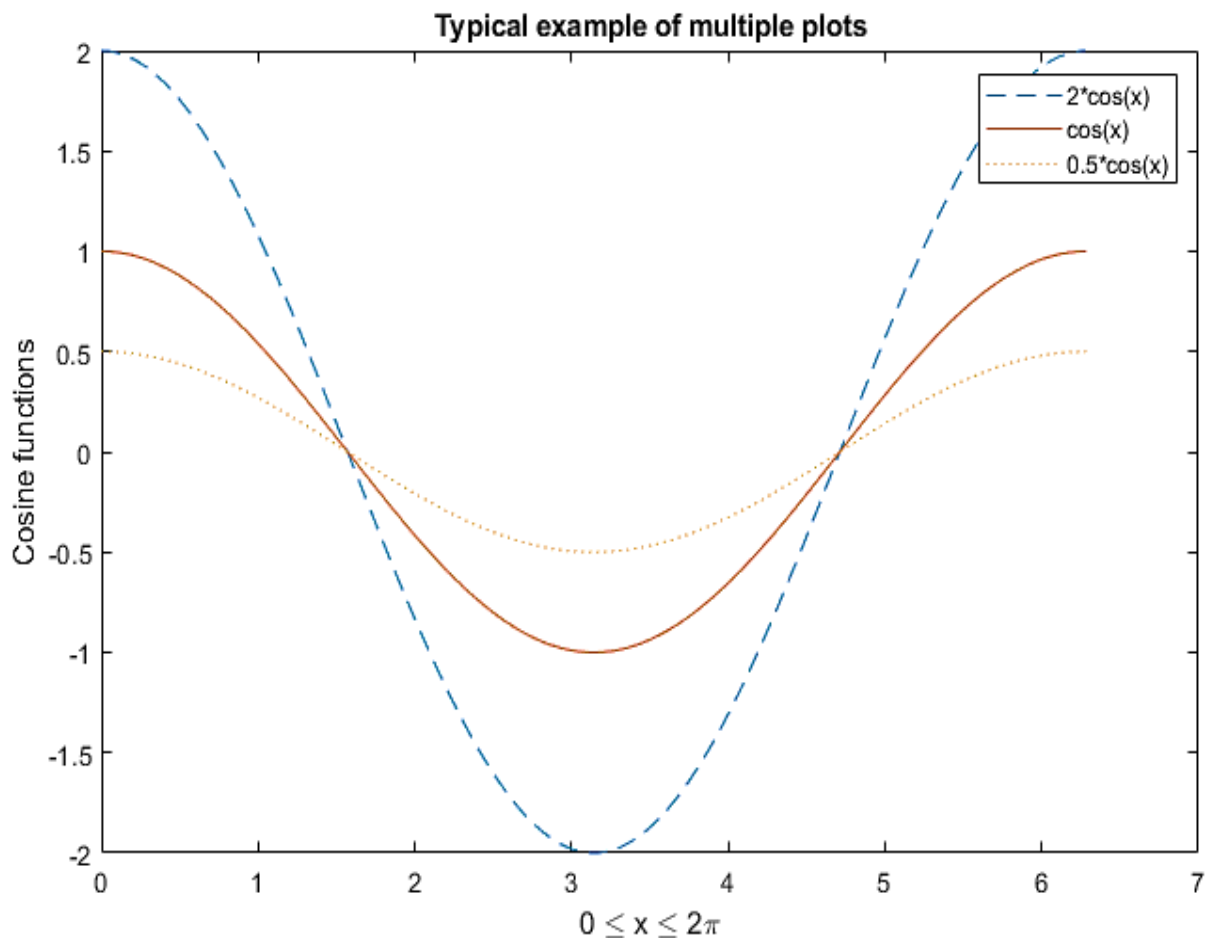




However, you can change the appearance of these graphic components or add annotations to the graph to help explain your data for presentation.

```
>> plot(x,y1,'--',x,y2,'-',x,y3,':')  
>> xlabel('0 \leq x \leq 2\pi') for x-axis  
>> ylabel('Cosine functions') for y-axis  
>> legend('2*cos(x)','cos(x)','0.5*cos(x)')  
>> title('Typical example of multiple plots')
```

Note !! legend used for creates a legend with descriptive labels for each plotted data series.





Multiple Plots in One Figure

Subplot (Create axes in tiled positions)

subplot(m,n,p) divides the current figure into an m-by-n grid and creates axes in the position specified by p. MATLAB numbers subplot positions by row. The first subplot is the first column of the first row, the second subplot is the second column of the first row, and so on. If axes exist in the specified position, then this command makes the axes the current axes.

m — Number of grid rows.

n — Number of grid columns.

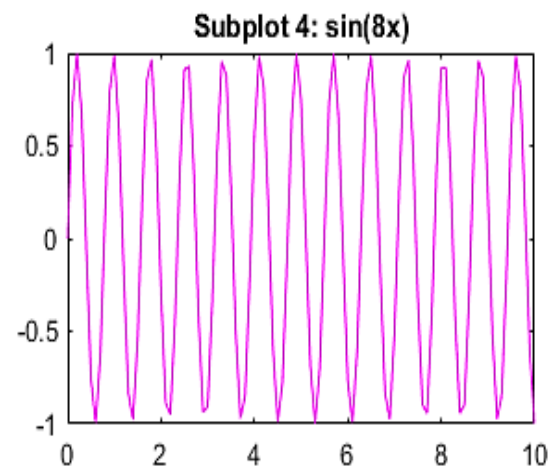
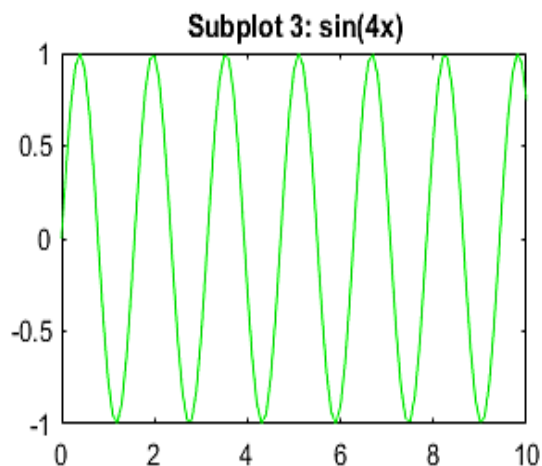
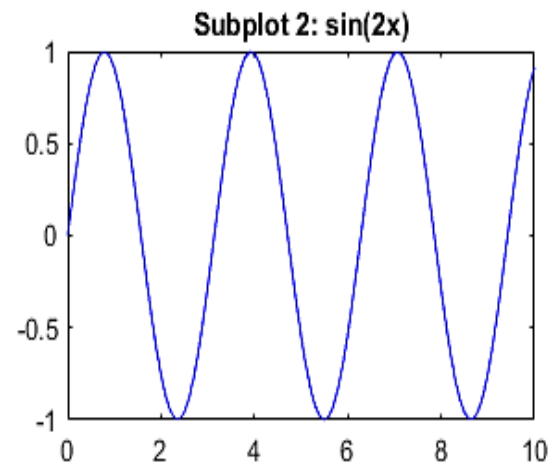
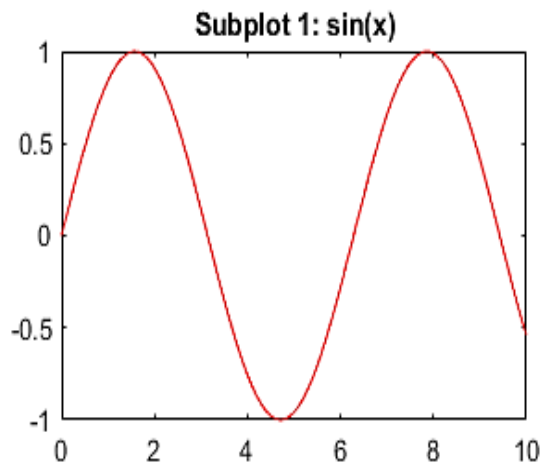
p — Grid position for new axes

The following program is to plot the sine function

```
>> x = 0:0.1:10;  
>> y1 = sin(x);  
>> y2 = sin(2*x);  
>> y3 = sin(4*x);  
>> y4 = sin(8*x);  
>> subplot(2,2,1)  
>> plot(x,y1,'-r')  
>> title('Subplot 1: sin(x)')  
>> subplot(2,2,2)  
>> plot(x,y2,'-b')  
>> title('Subplot 2: sin(2x)')
```



```
>> subplot(2,2,3)
>> plot(x,y3,'-g')
>> title('Subplot 3: sin(4x)')
>> subplot(2,2,4)
>> plot(x,y4,'-m')
>> title('Subplot 4: sin(8x)')
```





Setting Axis Limits

Axis : Set axis limits and aspect ratios

axis(limits) specifies the limits for the current axes. Specify the limits as vector of four, six, or eight elements.

For Cartesian axes, specify the **limits** in one of these forms:

[xmin xmax ymin ymax] — Set the x-axis limits to range from xmin to xmax.
Set the y-axis limits to range from ymin to ymax.

[xmin xmax ymin ymax zmin zmax] — Also set the z-axis limits to range from zmin to zmax.

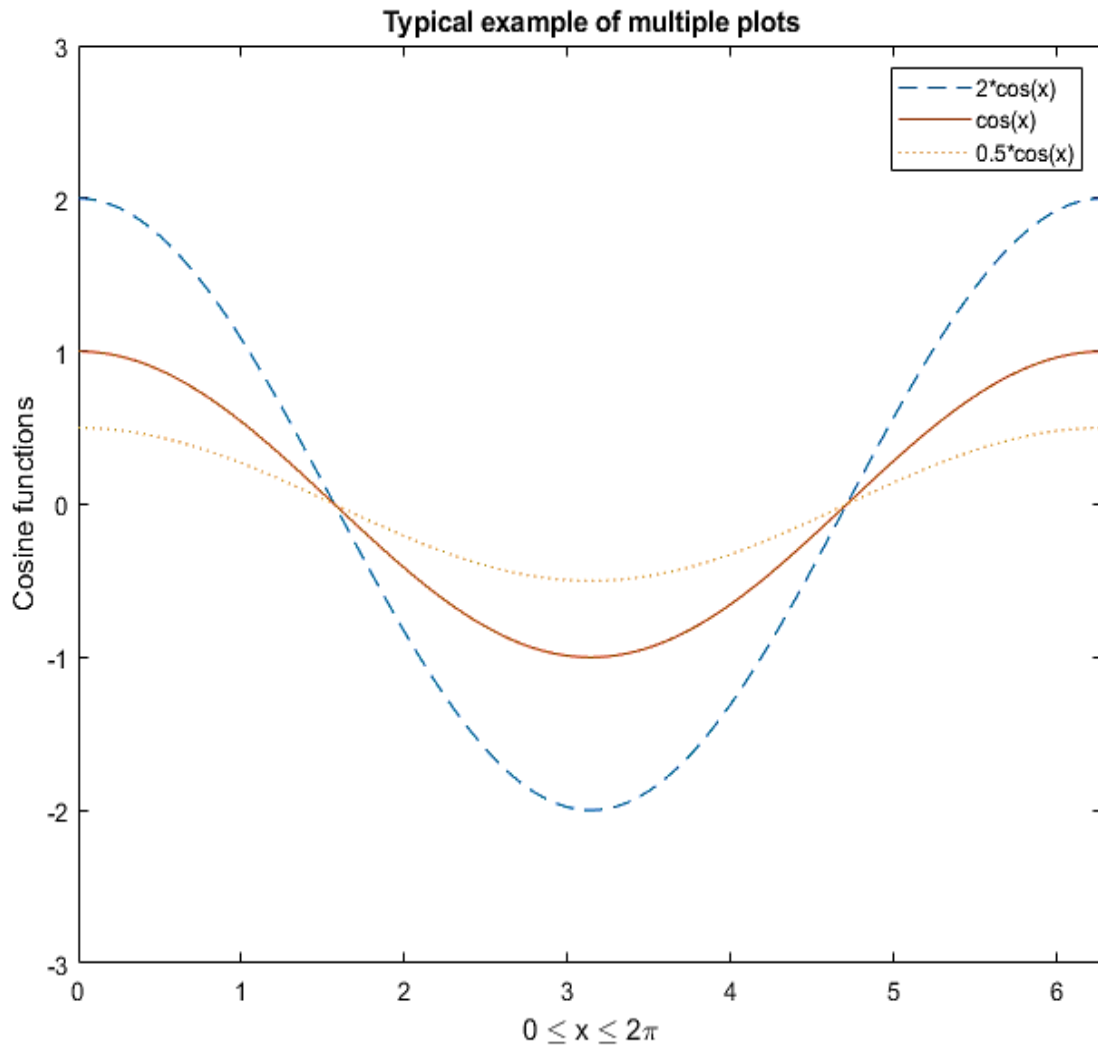
Example: `axis([0 1 0 1])`

Example: `axis([0 1 0 1 0 1])`

Example: `axis([0 inf 0 inf])`

When back to example in (Multiple Data Sets in One Graph) and use

```
>> axis([0 2*pi -3 3])
```



H.W3

Plot in on figure of Sinc function, where: $-2\pi \leq x \leq 2\pi$

1- $y = \sin(x) / x$,

2- $y = \sin(1.5x) / x$,

3- $y = \sin(2x) / x$,

4- $y = \sin(2.5x) / x$,

With use 3 symbols of specifying line styles and colors, and defined labels, legend for each plot, axis adjust.