

Making 2D Plots in MATLAB

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Overview

Plotting in MATLAB

- Plotting (x, y) data
- Axis scaling and annotation

Plotting (x, y) Data (1)

Two dimensional plots are created with the `plot` function

Syntax:

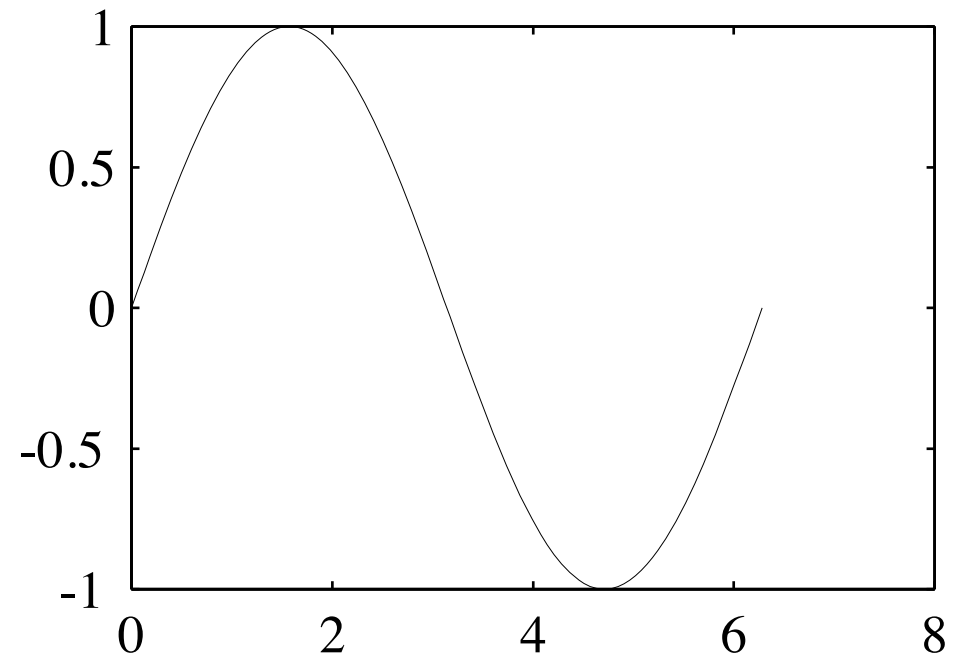
```
plot(x,y)
plot(xdata,ydata,LineStyle)
plot(x1,y1,x2,y2,...)
plot(x1,y1,LineStyle1,x2,y2,LineStyle2,...)
```

Note: x and y must have the same *shape*,
 $x1$ and $y1$ must have the same *shape*,
 $x2$ and $y2$ must have the same *shape*, etc.
By *shape* we mean the same number of rows and columns.

Plotting (x, y) Data (2)

Example: A simple line plot

```
>> x = linspace(0,2*pi);  
>> y = sin(x);  
>> plot(x,y);
```



Line and Symbol Types (1)

The curves for a data set are drawn from combinations of the color, symbol, and line types in the table to the right.

To choose a color/symbol/line style, choose *one* entry from each column.

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

Line and Symbol Types (2)

Examples:

Put yellow circles at the data points:

```
plot(x,y,'yo')
```

Plot a red dashed line with no symbols:

```
plot(x,y,'r--')
```

Put black diamonds at each data point and connect the diamonds with black dashed lines:

```
plot(x,y,'kd--')
```

Alternative Axis Scaling (1)

Combinations of linear and logarithmic scaling are obtained with functions that, other than their name, have the same syntax as the `plot` function.

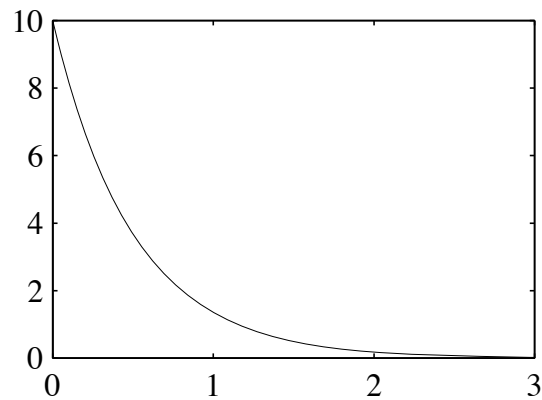
Name	Axis scaling
<code>loglog</code>	$\log_{10}(y)$ versus $\log_{10}(x)$
<code>plot</code>	linear y versus x
<code>semilogx</code>	linear y versus $\log_{10}(x)$
<code>semilogy</code>	$\log_{10}(y)$ versus linear x

Note: As expected, use of logarithmic axis scaling for data sets with negative or zero values results in a error. MATLAB will complain and then plot only the positive (nonzero) data.

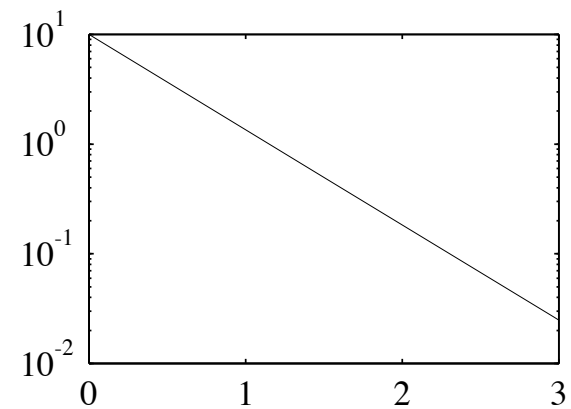
Alternative Axis Scaling (2)

Examples:

```
>> x = linspace(0,3);  
>> y = 10*exp(-2*x);  
>> plot(x,y);
```



```
>> x = linspace(0,3);  
>> y = 10*exp(-2*x);  
>> semilogy(x,y);
```



Multiple plots per figure window (1)

The `subplot` function is used to create a matrix of plots in a single figure window.

Syntax:

```
subplot(nrows,ncols,thisPlot)
```

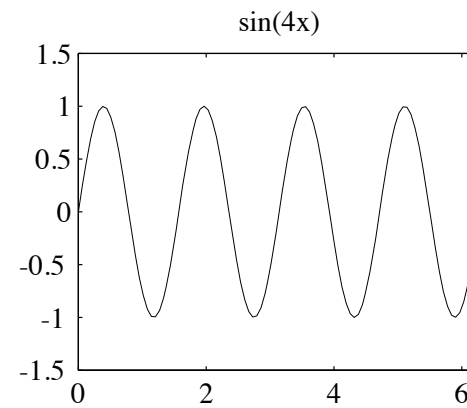
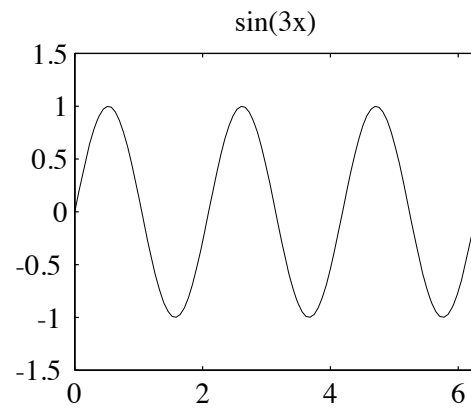
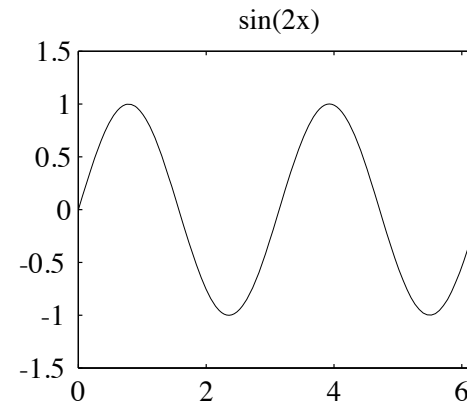
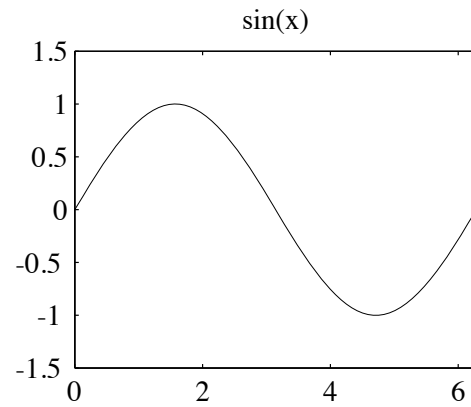
Repeat the values of *nrows* and *ncols* for all plots in a single figure window. Increment *thisPlot* for each plot

Example:

```
>> x = linspace(0,2*pi);  
  
>> subplot(2,2,1);    plot(x,sin(x));    axis([0 2*pi -1.5 1.5]);    title('sin(x)');  
  
>> subplot(2,2,2);    plot(x,sin(2*x));    axis([0 2*pi -1.5 1.5]);    title('sin(2x)');  
  
>> subplot(2,2,3);    plot(x,sin(3*x));    axis([0 2*pi -1.5 1.5]);    title('sin(3x)');  
  
>> subplot(2,2,4);    plot(x,sin(4*x));    axis([0 2*pi -1.5 1.5]);    title('sin(4x)');
```

(See next slide for the plot.)

Multiple plots per figure window (2)



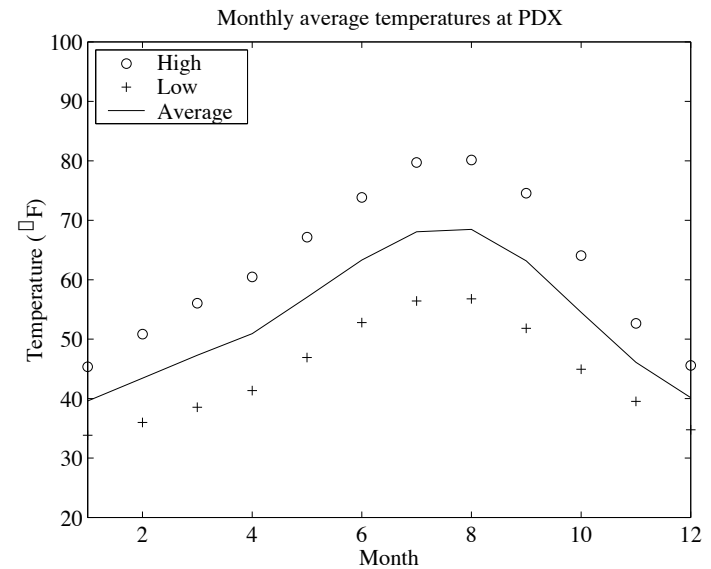
Plot Annotation

Name	Operation(s) performed
<code>axis</code>	Reset axis limits
<code>grid</code>	Draw grid lines corresponding to the major major ticks on the x and y axes
<code>gtext</code>	Add text to a location determined by a mouse click
<code>legend</code>	Create a legend to identify symbols and line types when multiple curves are drawn on the same plot
<code>text</code>	Add text to a specified (x, y) location
<code>xlabel</code>	Label the x -axis
<code>ylabel</code>	Label the y -axis
<code>title</code>	Add a title above the plot

Plot Annotation Example

```
>> D = load('pdxTemp.dat');   m = D(:,1);   T = D(:,2:4);

>> plot(m,t(:,1),'ro',m,T(:,2),'k+',m,T(:,3),'b-');
>> xlabel('Month');
>> ylabel('Temperature ({}^\circ F)');
>> title('Monthly average temperature at PDX');
>> axis([1 12 20 100]);
>> legend('High','Low','Average',2);
```



Note: The pdxTemp.dat file can be downloaded from
<http://web.cecs.pdx.edu/~gerry/nmm/mfiles/>.