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Lecture Title: [Introduction to MATLAB Plotting]





Computer II (MATLAB)

الحاسوب 2
2025-2024

Lecture 8

by

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Introduction to MATLAB Plotting

- MATLAB provides extensive facilities for displaying vectors and matrices as graphs.
- Important functions include plot, xlabel, ylabel, title, and legend.
- Example Applications: Signal processing, data visualization, and engineering design.



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Types of MATLAB Plots

There are various functions that you can use to plot data in MATLAB®. This table classifies and illustrates the common graphics functions.

Line Plots	Scatter and Bubble Charts	Data Distribution Plots	Discrete Data Plots	Geographic Plots	Polar Plots	Contour Plots	Vector Fields	Surface and Mesh Plots	Volume Visualization	Animation	Images
plot 	scatter 	histogram 	bar 	geoplot 	polarplot 	contour 	quiver 	surf 	streamline 	animatedline 	image
plot3 	scatter3 	histogram2 	barh 	geoscatter 	polarhistogram 	contourf 	quiver3 	surfc 	streamslice 	comet 	imagesc
stairs 	bubblechart 	scatterhistogram 	bar3 	geobubble 	polarscatter 	contour3 	feather 	surf1 	streamparticles 	comet3 	
errorbar 	bubblechart3 	boxchart 	bar3h 		polarbubblechart 	contourslice 		ribbon 	streamribbon 		
area 	swarmchart 	swarmchart 	pareto 		compassplot 	fcontour 		pcolor 	streamtube 		
stackedplot 	swarmchart3 	swarmchart3 	stem 		fpolarplot 			fsurf 	coneplot 		
loglog 	spy 	piechart 	stem3 					fimplicit3 	slice 		
semilogx 		donutchart 	stairs 					mesh 			
semilogy 		wordcloud 						meshc 			
fplot 		bubblecloud 						meshz 			
fplot3 		heatmap 						waterfall 			
fimplicit 		parallelplot 						fmesh 			
		plotmatrix 									

Related Topics

- Create 2-D Line Plot
- MATLAB Plot Gallery

[Link: https://uk.mathworks.com/help/matlab/creating_plots/types-of-matlab-plots.html](https://uk.mathworks.com/help/matlab/creating_plots/types-of-matlab-plots.html)



Creating a Basic Plot

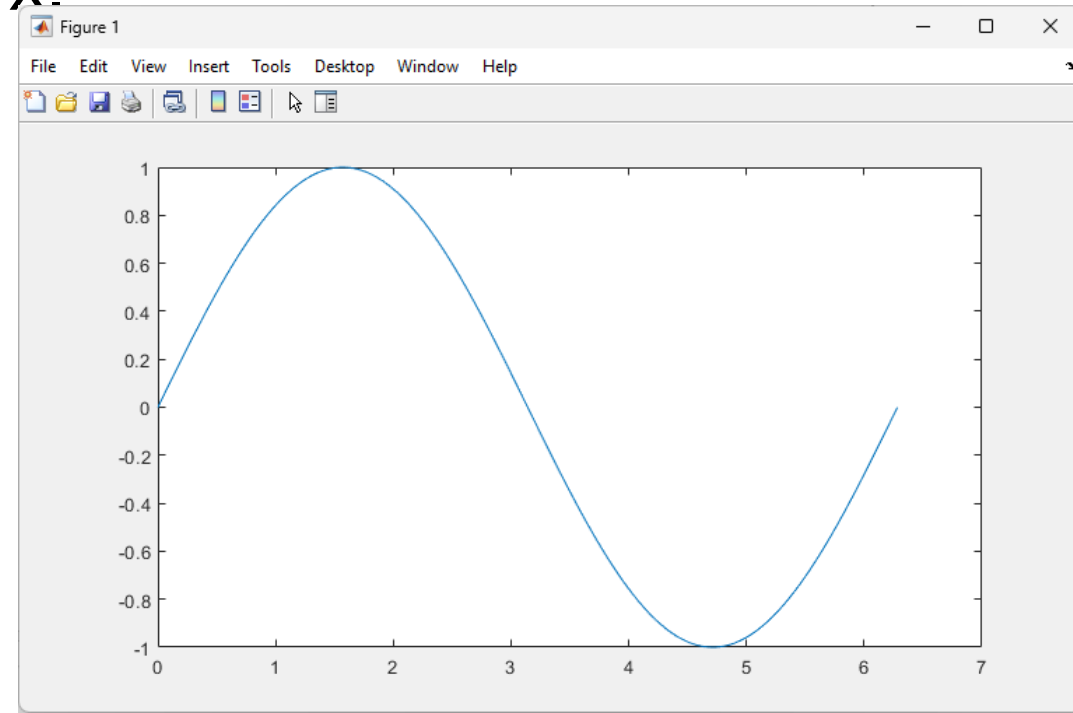
- Create a Plot
 - `plot(y)`: Creates a piecewise linear graph of vector y vs. its index.
 - `plot(x, y)`: Creates a graph of y vs. x .

- Example:

`x = 0:pi/100:2*pi;`

`y = sin(x);`

`plot(x, y);`



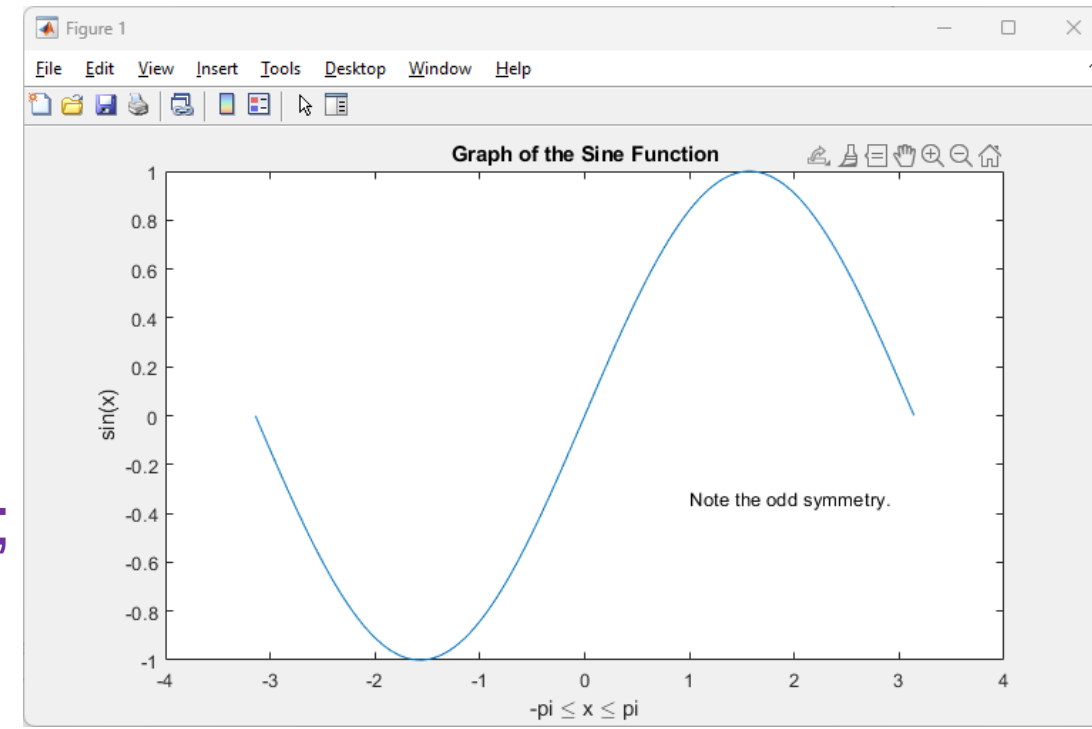


Axis Labels and Titles

- Tools:
 - `xlabel`, `ylabel`, `zlabel`: Add labels to the x, y, and z axes.
 - `title`: Adds a title to the plot.
 - `text`: Inserts text anywhere in the figure.

- Example:

```
x = -pi:pi/100:pi;  
y = sin(x);  
plot(x, y);  
xlabel('-pi \leq x \leq pi');  
ylabel('sin(x)');  
title('Graph of the Sine Function');  
text(1, -1/3, 'Note the odd symmetry.');
```



Multiple Data Sets in One Graph

- Plotting Multiple Curves:
 - Use multiple x-y pairs in the plot function.
 - MATLAB automatically cycles through colours.

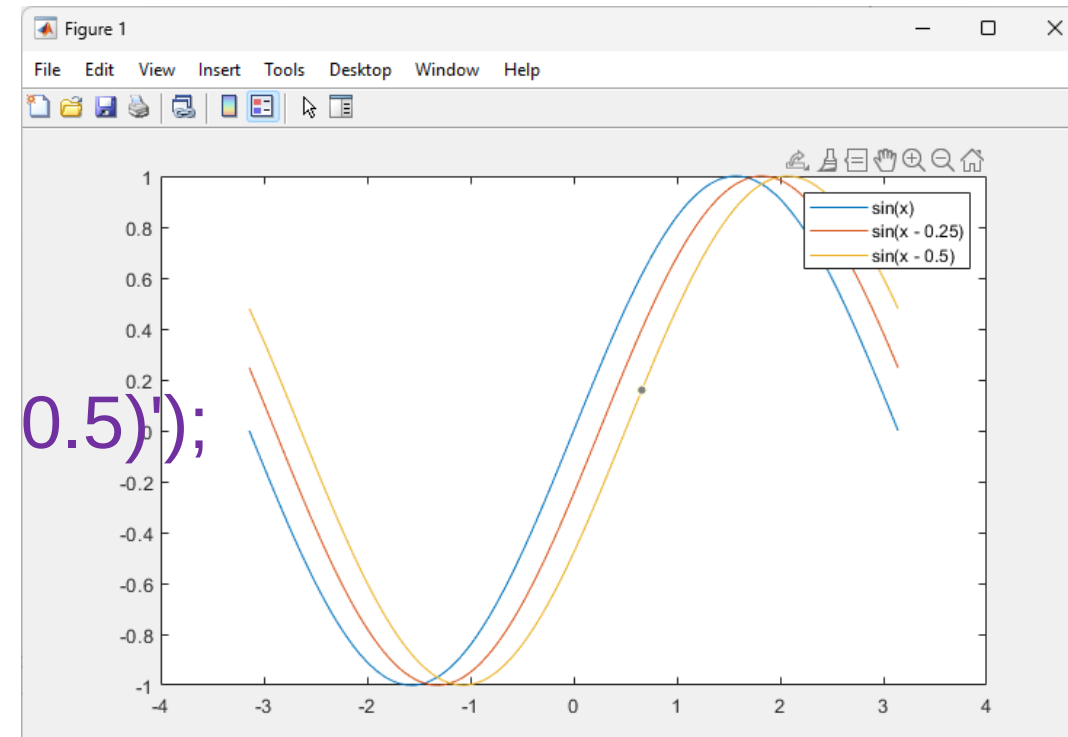
- Example:

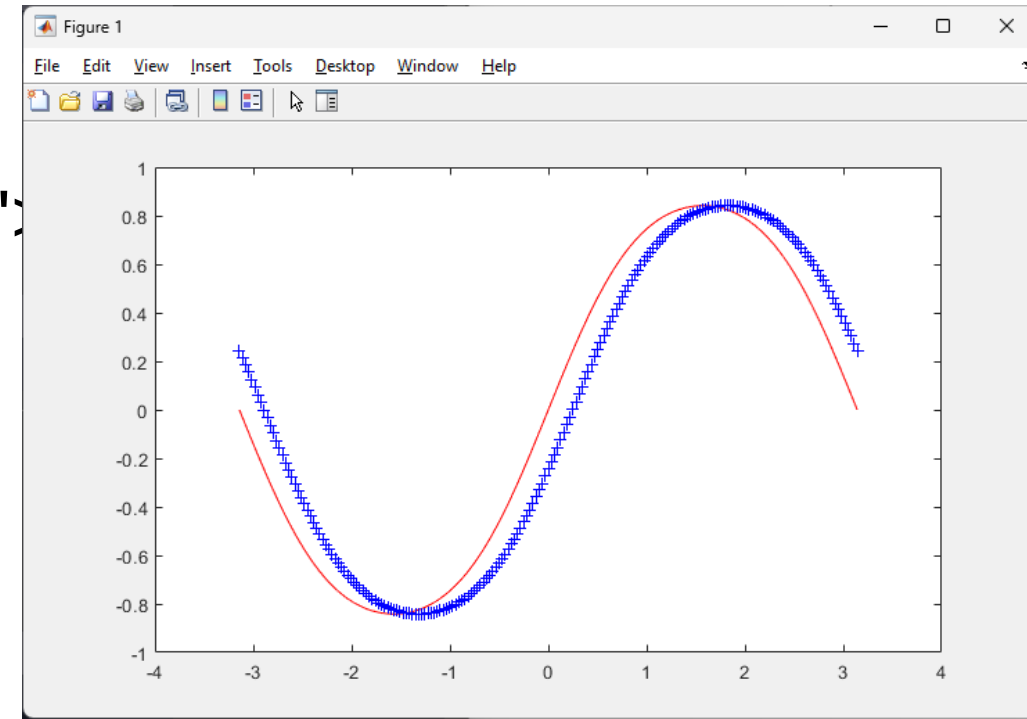
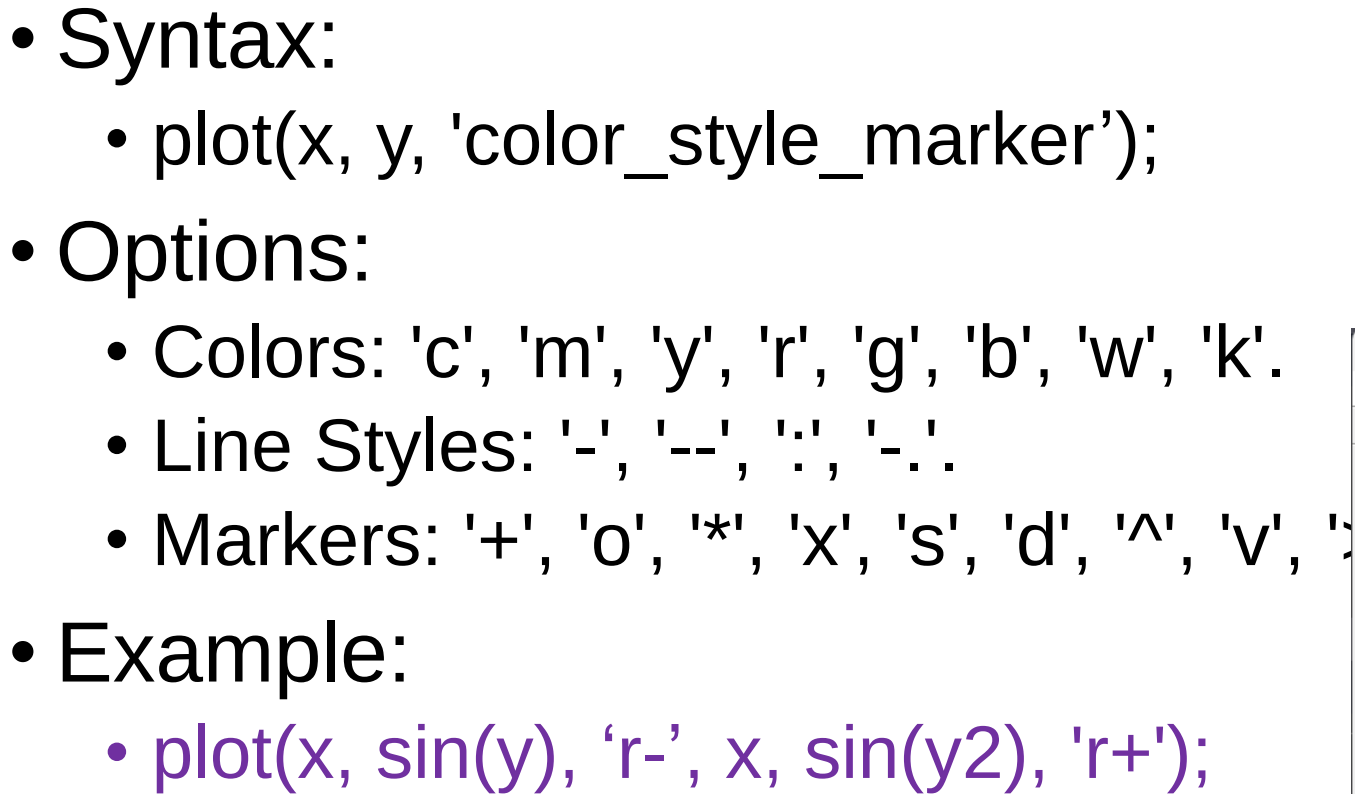
$y_2 = \sin(x - 0.25);$

$y_3 = \sin(x - 0.5);$

`plot(x, y, x, y2, x, y3);`

`legend('sin(x)', 'sin(x - 0.25)', 'sin(x - 0.5)');`





Multiple Plots in One Figure

- Using subplot:
 - `subplot(m, n, p)`: Divides the figure into an **m-by-n** grid and selects the **p** subplot.

- Example:

`t = 0:pi/10:2*pi;`

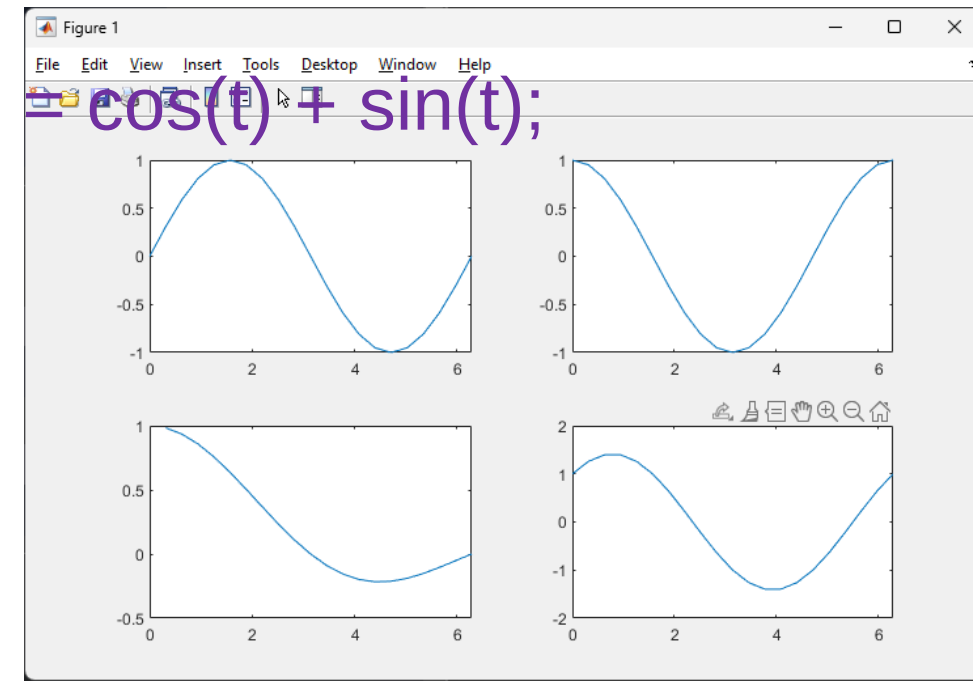
`y1 = sin(t); y2 = cos(t); y3 = sin(t)./t; y4 = cos(t) + sin(t);`

`subplot(2, 2, 1); plot(t, y1);`

`subplot(2, 2, 2); plot(t, y2);`

`subplot(2, 2, 3); plot(t, y3);`

`subplot(2, 2, 4); plot(t, y4);`





Setting Axis Limits

- Syntax:
 - `axis([xmin xmax ymin ymax]);`
- Example:
`axis([-pi pi -1 1]);`



Summary



- Key Points:
 - Basic plotting in MATLAB using `plot`, `xlabel`, `ylabel`, `title`.
 - Plotting multiple datasets and customizing line styles and colors.
 - Using `subplot` for multiple plots in one figure.

