M.Tech in Information Security
Computer Science and Engineering Department, IIT Jammu

Matlab - Plots

Software Tools - LaTeX Assignment

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Content

Introduction

Definition

- To plot the graph of a function, you need to take the following steps −
  - Define the function, **y = f(x)**
  - Call the **plot** command, as **plot(x,y)**
- **Example:** Plot the function

$$y = x^2 - 10x + 15$$

for the values of x between 0 and 10.

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for the values of x between 0 and 10.

x = 0:1:10 or linspace(0,10,11)

Definition
Example

Code:

```
x = 0:1:10;
y = x.^2 - 10 * x + 5
plot(x,y)
grid on
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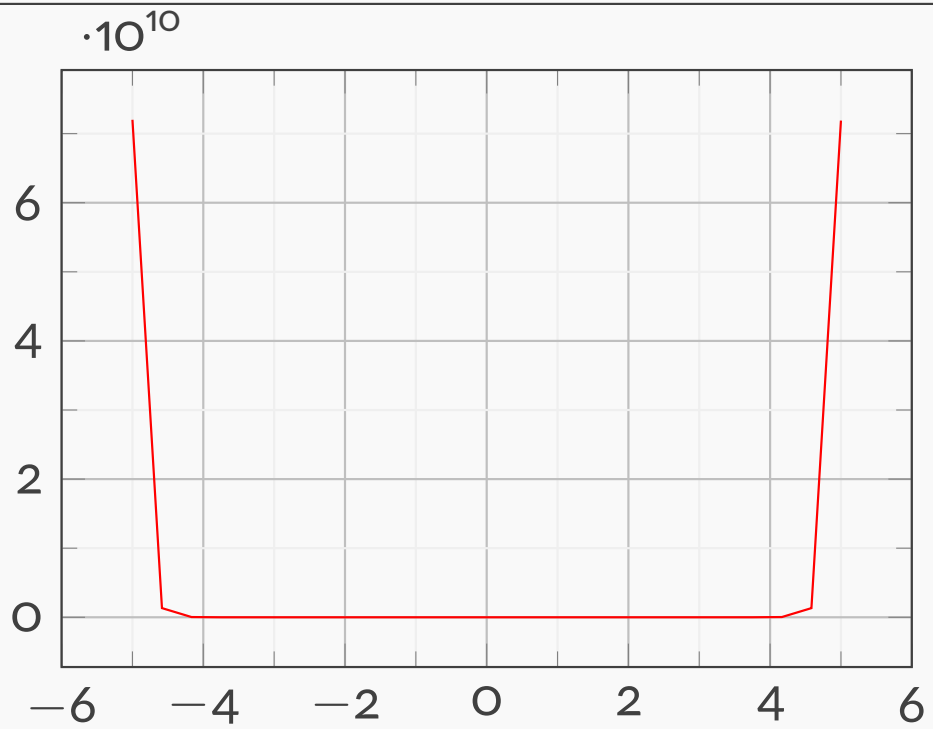

Matlab Plots
Terms

Terms generally used in Matlab plotting are…

- **CLF:** clf deletes all children of the current figure that have visible handles.
- **clf(fig):** It deletes all children of the specified figure that have visible handles.
- **figure:** It creates a new figure window using default property values. The resulting figure is the current figure.
- **figure(n):** It finds a figure in which the Number property is equal to n, and makes it the current figure. If no figure exists with that property value, MATLAB® creates a new figure and sets its Number property to n.
- **figure(Name, Value):** It modifies properties of the figure using one or more name-value pair arguments. For example, figure('Color','white') sets the background color to white.

Terms

Terms generally used in Matlab plotting are…

- **hold on:** It retains plots in the current axes so that new plots added to the axes do not delete existing plots.
- **hold off:** It sets the hold state to off so that new plots added to the axes clear existing plots and reset all axes properties.
- **grid on:** This command allows us to put the grid lines on the graph.
- **grid off:** This command allows us to remove the grid lines on the graph.
- **title:** This command allows us to put a title on the graph.
- **xlabel** and **ylabel:** These commands generate labels along x-axis and y-axis.

Terms

Terms generally used in Matlab plotting are...

- **axis equal:** This command allows generating the plot with the same scale factors and the spaces on both axes.
- **axis square:** This command generates a square plot.
- **legend:** Legend function is used to add descriptive labels to our plots.
- **plot:** It plots the curve defined by the function y = f(x) over the default interval [-5 5] for x.
- **bar:** It creates a bar graph with one bar for each element in y. If y is an m-by-n matrix, then bar creates m groups of n bars.
- **scatter:** It creates a scatter plot with circular markers at the locations specified by the vectors x and y.

Plot Types

There are many types of plots[1] in Matlab. Some of them are....

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	pie	bar3	geobubble	polarscatter	contour3	feather	surfl	streamparticles	comet3	
errorbar	bubblechart3	pie3	bar3h		polarbubblechart	contourslice		ribbon	streamribbon		
area	swarmchart	scatterhistogram	pareto		compass	fcontour		pcolor	streamtube		
stackedplot	swarmchart3	swarmchart	stem		ezpolar			fsurf	coneplot		
loglog	spy	swarmchart3	stem3					fimplicit3	slice		
semilogx		wordcloud	stairs					mesh			

[1]Reference of plot types are taken from Mathworks.

Plot Types

The main types of plot which we generally talk about are:

- Line Plots
- Bar Graph
- Histogram
- 2D Scatter
- Pie Chart
- Area
- Sinusoidal
- Log, Exponential
- Geo-plot
- Geo-scatter

Single Plot
Sinusoidal

Code:

```
x = 0 : pi/100 : 2 * pi
y = sin(x)
plot(x,y)
grid on
legend('simple plot')
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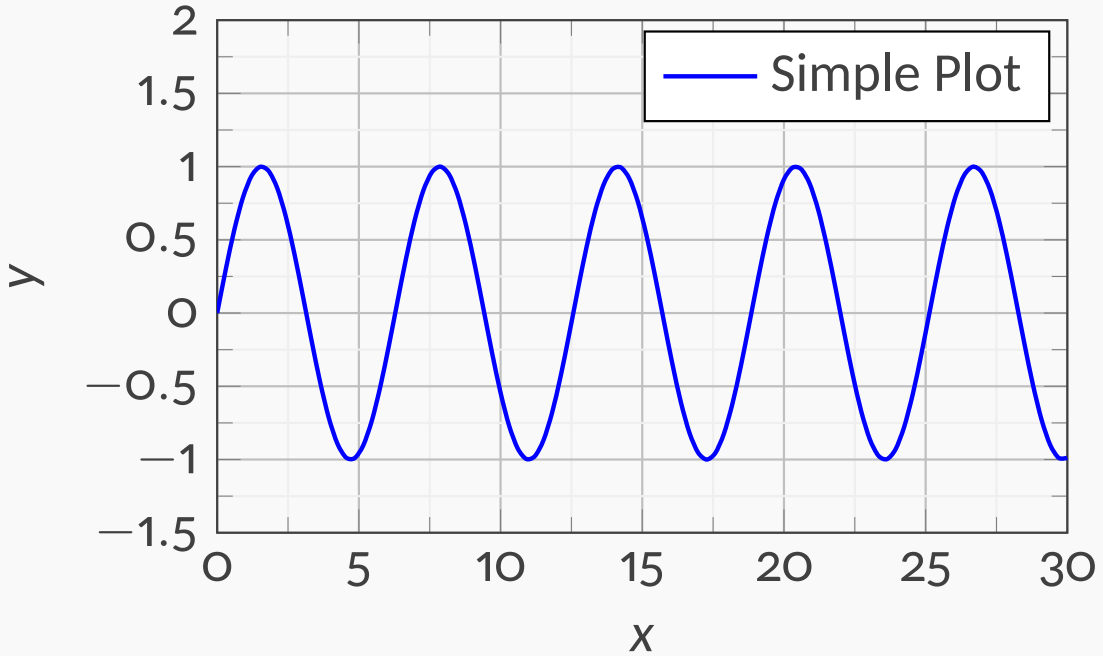
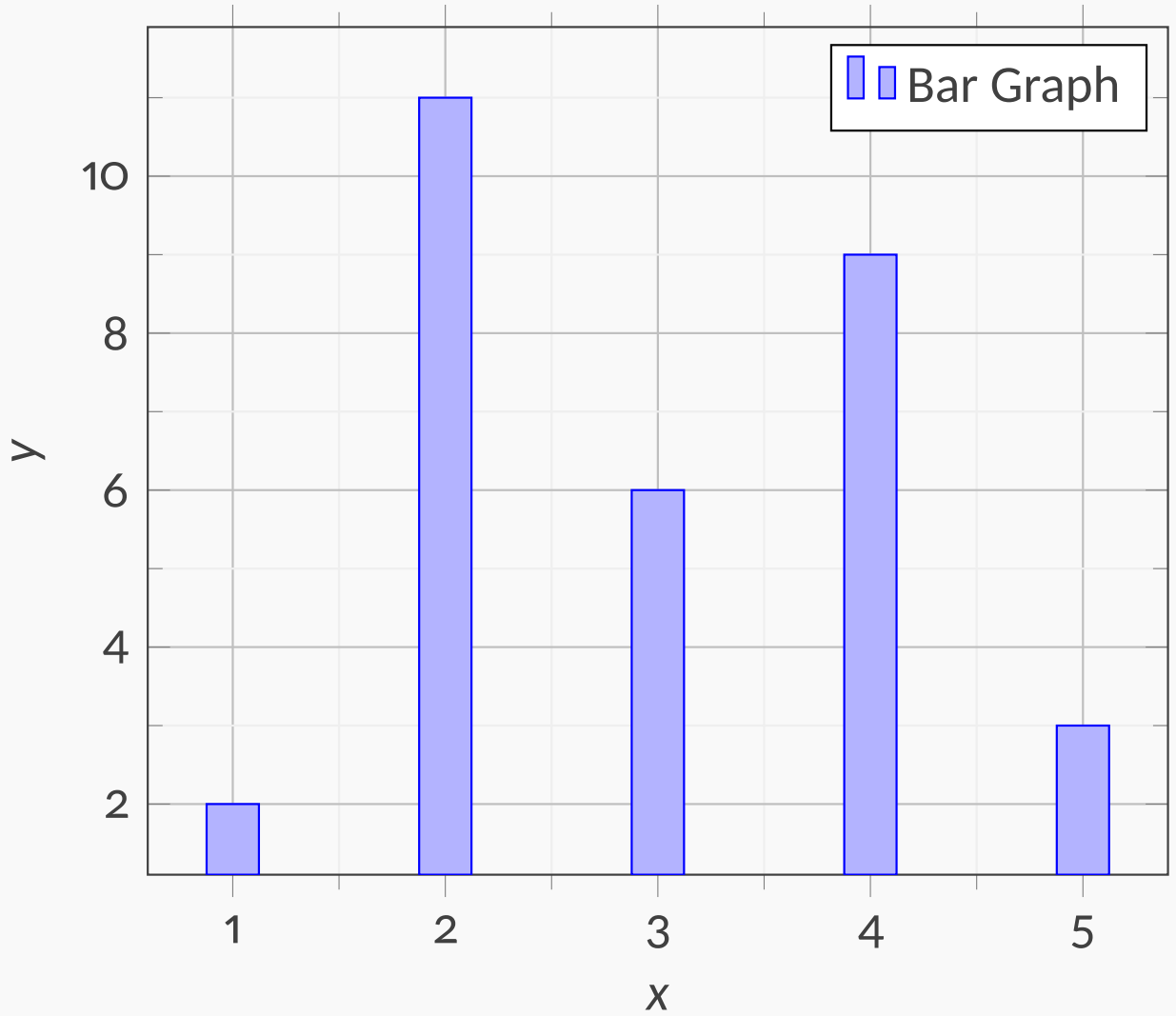


Single Plot
Bar Graph

Code:

```
clf
x = 1:5
y = [2 11 6 9 3]
figure(1)
bar(x,y)
grid on
legend('bar graph')
```

Single Plot
Bar Graph



Multiple Plot
Example

Code:

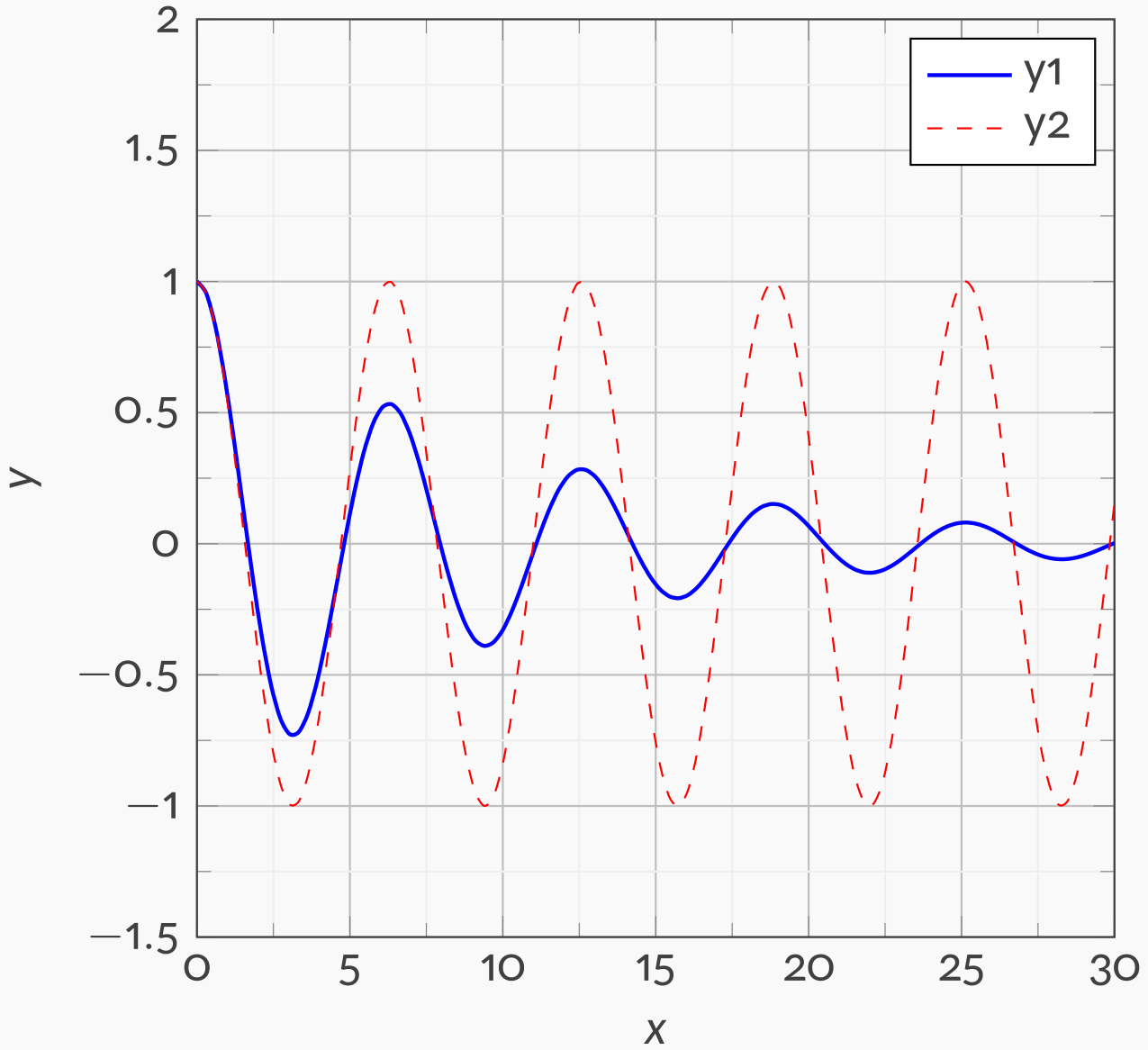
```
clf
x = linspace(-2 * pi, 2 * pi)
y1 = (-x/10) * cos(x) + sin(x)/10
y2 = cos(x)

figure(2)
plot(x,y1,'-')

hold on
plot(x,y2,'--')
grid on
legend('y1','y2')
```

Multiple Plot

Example



Scatter Plot
Example

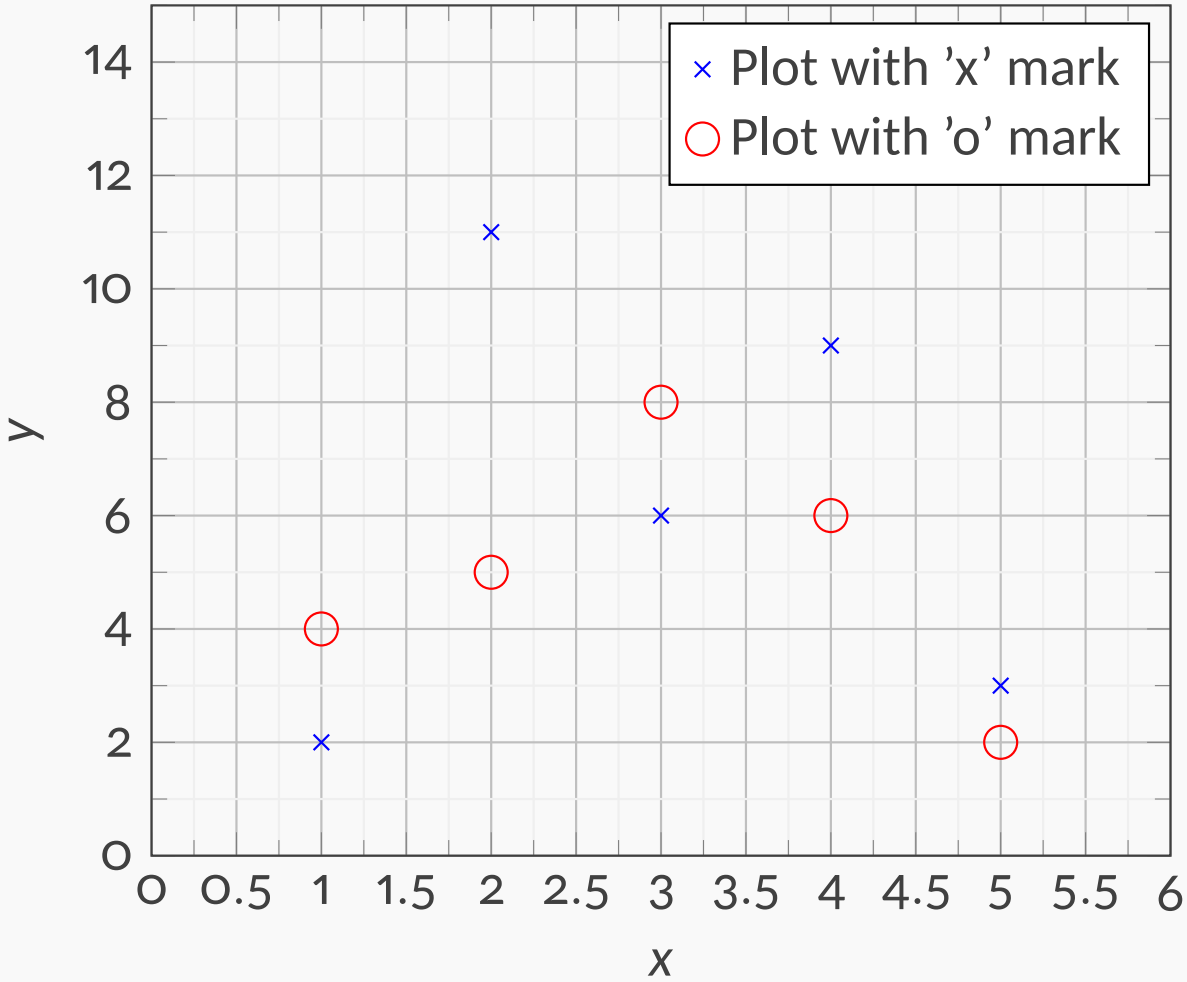
Code:

```
clf
x = 1:5
y1 = [2 11 6 9 3]
y2 = [4 5 8 6 2]

figure(2)
plot(x,y1,'x')

hold on
plot(x,y2,'o')
grid on
legend('y1','y2')
```

Scatter Plot
Example



Reference

Reference

- Tutorialspoint MATLAB Tutorial
  https://www.tutorialspoint.com/matlab/index.htm
- MathWorks Documentation
  https://in.mathworks.com/help/matlab/ref/plot.html

Thank You