Plotting and Graphics

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Plotting

- MATLAB can be used to produce a wide variety of plots and curves, including 2D plots, 3D plots and 3D surface plots.

- To plot a data set, just create two vectors containing the x and y values(2D) to be plotted and use the plot function

The Purpose of Using Graphics

- In your own problem solving
  - As part of design
  - As analysis of operating data

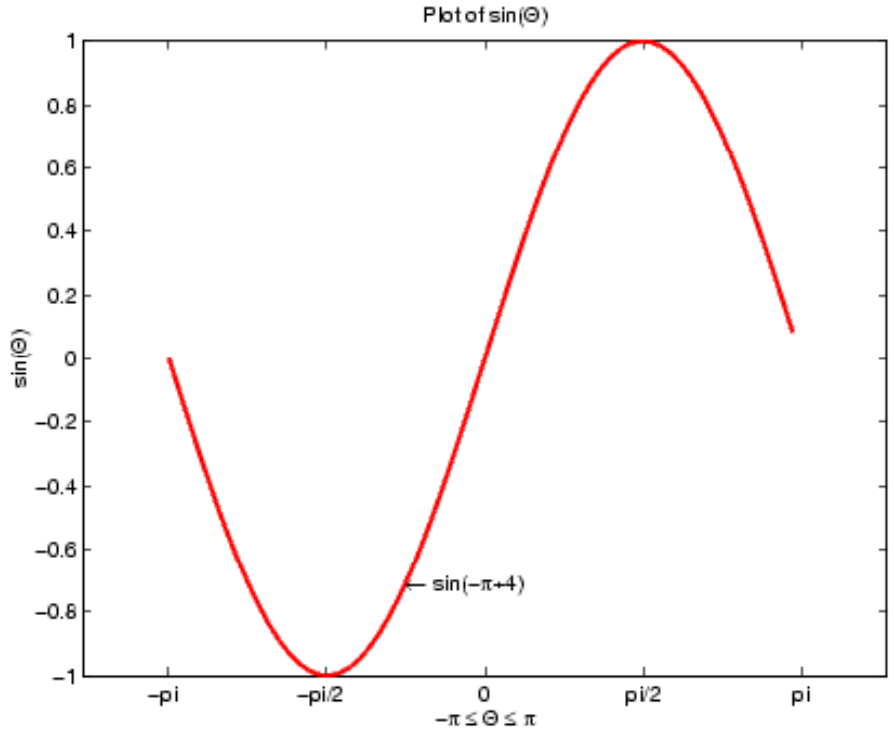
- For persuasion and interpretation
  - Dramatize relationships
  - Promote identification
  - Make complex information accessible

Criteria for Good Graphics

- The Purpose must be clear
- Pattern and arrangement lead eye without distraction?
- Similar items grouped and indicated?
- Graphic hierarchy consistent?
- Fonts legible?

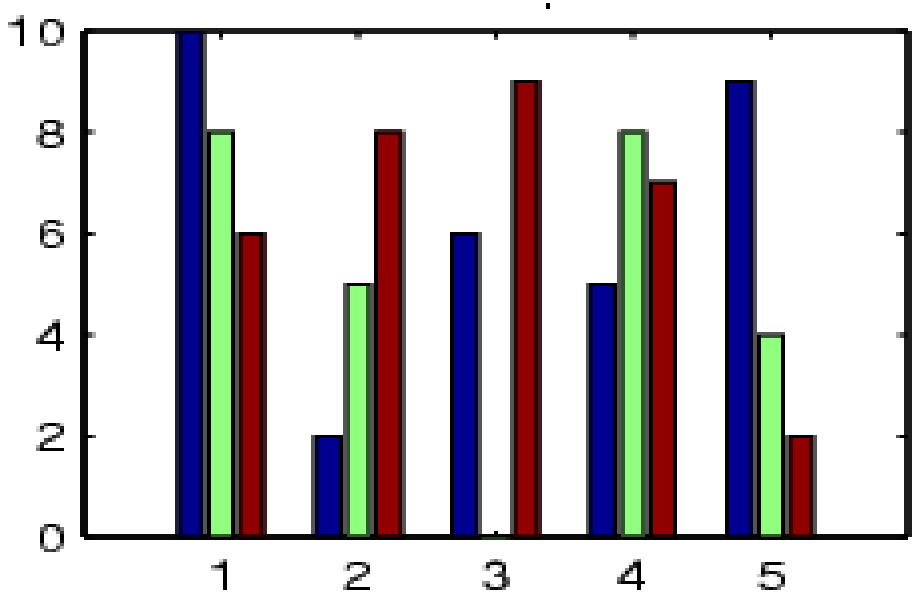
Types of Graphics in Matlab

- Line graph
  - 2D
  - 3D



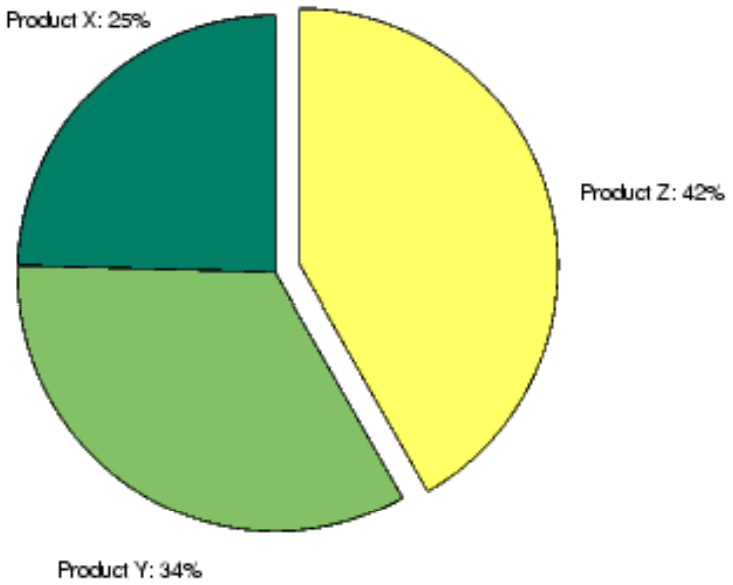
Types of Graphics in Matlab

- Column or bar graph

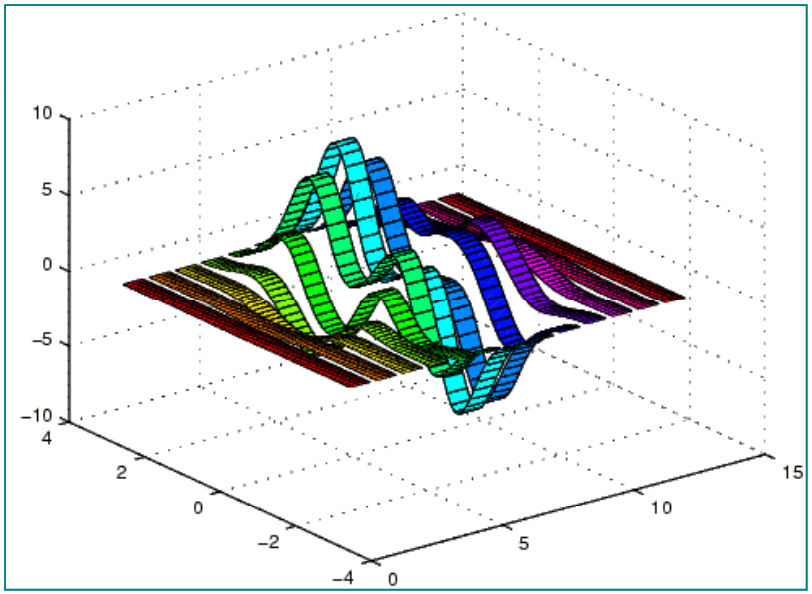


Types of Graphics in Matlab

- Pie graph
  - Shows “whole to part” relationships



Types of Graphics in Matlab



Select Right Type of Graphic

- What Is Your Purpose?
  - Problem solving?
  - Persuasion and interpretation?
- Who Is the Audience?
  - What are their backgrounds?
  - What do they want to know?
- What Is the Context?
  - Presentation?
  - Report/Paper?

Context Affects Graph Qualities

- Presentation
  - Big titles, labels, etc.
  - Can use any color
  - Can use animation
- Report
  - Smaller titles, labels, etc.
  - Often just black and white
  - Animation impossible

Example 1

- Let us create two vectors **x** and **y**

```
>>  x = [1 2 3 4 5 6 7 8 9];
>>  y = [2 3 5 7 8 3 0 2 8];
```

- The plot command creates a linear x-y plot

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

Example 2

- Plot the quadratic equation $3x^2 + 7x - 3 = 0$ from x = -10 to 10 steps 0.01

```
>> x = [-10: 0.01:10];
>>y = 3.*x.^2+7.*x-3;
>>plot(x, y)
```

Labeling the axes and Titles

- For labeling the axes, we use

  xlabel

  ylabel

  title functions

These functions can be placed on the same lines as the plot commands

Example 1

```
>> x = 0: 1:10
>> y = x.^2-10.*x+15;
Plot(x,y); title('Plot of y = x.^2-10.*x+15 ');
   xlabel('x - axis'); ylabel('y-axis'); grid on
```

Example 2

Distance (m)	Velocity(m/s)
0	102.7
29.1	92.4
55.1	82.1
78.0	71.9
97.9	61.6
114.7	51.3
128.5	41.1
139.2	30.8
146.9	20.5
151.5	10.3
153.0	0.0

Changing Appearances

- It is possible to specify colour, line style, and markers(e.g., plus signs, circles etc.) when you plot data most especially when dealing with multiple plots.

plot(x,y, 'colour style marker')

Colours

c – Cyan	y – yellow	g - green
m – magenta	r – red	b – blue
w- white	k- black	

Changing Appearances

- Markers styles/plot symbols

o	circle
d	diamond
h	hexagram
p	pentagram
+	plus
.	Point
s	square
*	star
v	Down triangle
<	Left triangle

>	Right triangle
^	Up triangle
X	X-mark

Line styles

-	solid
:	dotted
-.	dash-dot
--	dashed
<none>	no line

Plotting multiple functions on one plot

- To plot multiple functions, it necessary to enter ‘hold on’ to hold the current plot and all axis properties so that subsequent graphing commands add to the existing graph(s)