16-Special Plots

text: Chapter 5.5-5.10

ECEGR 101

Engineering Problem Solving with Matlab

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Overview

- Subplots
- Histograms
- Bar Charts
- Pie Charts
- Stem Plots
- Stair Plots
- Polar Plots
- Log Plots
- Saving Figures

Multiple Plots

subplot(m, n, p)

creates mxn rectangular subplots

p is the current (active) subplot

Example

```
x = 0:0.001:100;
y1 = x;
y2 = x.^2;
y3 = sin(x);
y4 = cos(x/4);
y5 = x.^3 - 15*x.^2 + x;
y6 = log(x+1);
y7 = sqrt(x);
y8 = abs(sin(x/4));
```

```
subplot(4,2,1)
plot(x, y1)
title('y(x) = x')

subplot(4,2,2)
plot(x, y2)
title('y(x) = x^2')
```

```
subplot(4,2,3)
plot(x, y3)
title('y(x) = sin(x)')

subplot(4,2,4)
plot(x, y4)
title('cos(x/4)')

subplot(4,2,5)
plot(x, y5)
title('x^3 - 15x^2 + x')
```

```
subplot(4,2,6)
plot(x, y6)
title('log(x+1)')

subplot(4,2,7)
plot(x, y7)
title('y(x) = sqrt(x)')

subplot(4,2,8)
plot(x, y8)
title('|sin(x/4)|')
```

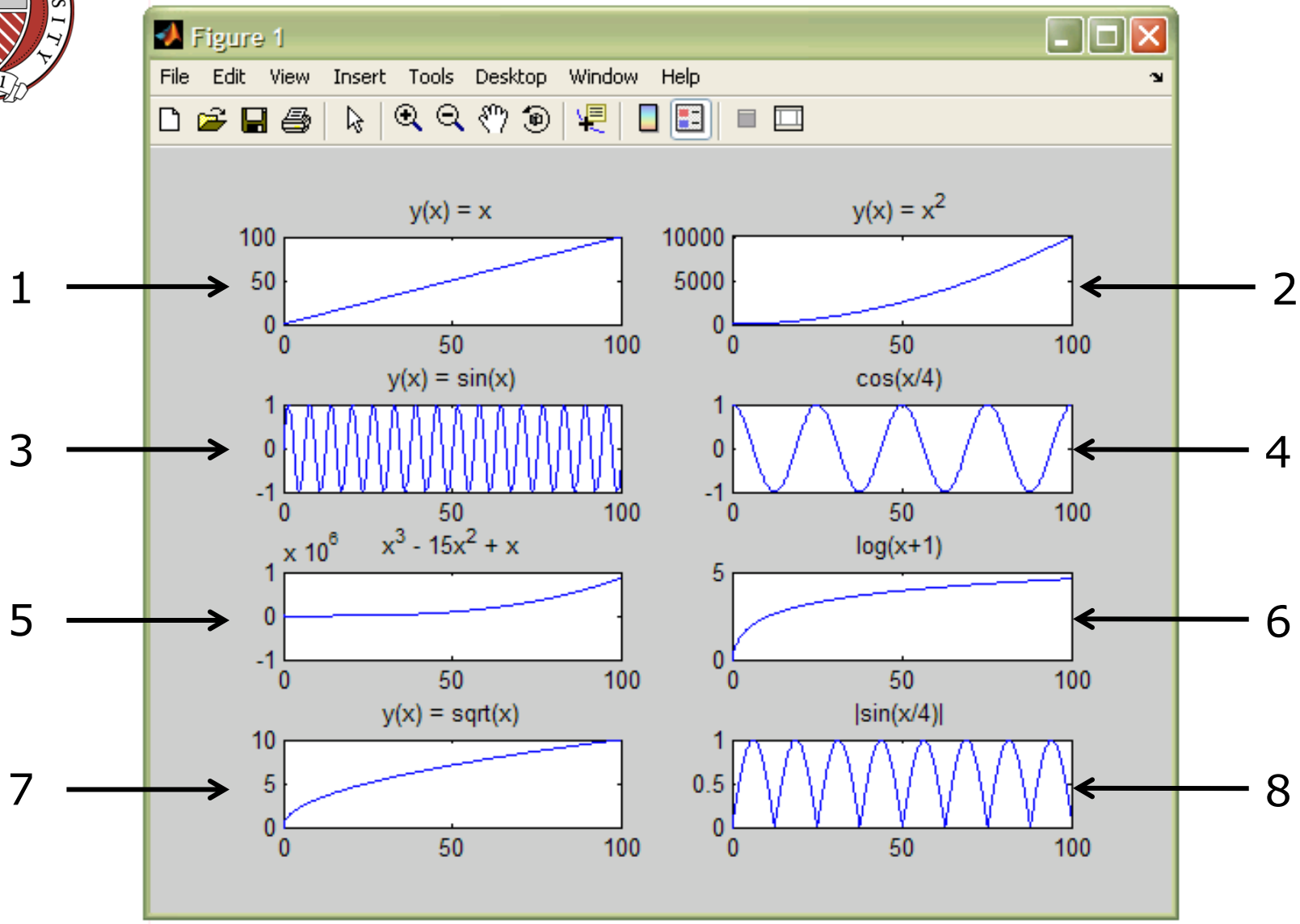


Figure 1
File Edit View Insert Tools Desktop Window Help
y(x) = x
y(x) = x^2
y(x) = sin(x)
cos(x/4)
x 10^6
x^3 - 15x^2 + x
log(x+1)
y(x) = sqrt(x)
|sin(x/4)|
1
2
3
4
5
6
7
8

Exercise

Use the subplot command to create four plots on one figure:

1) plot of ln(x) for x between 0 and 10
2) plot of log(x) for x between 0 and 10
3) plot of e^x for x between 0 and 5
4) plot of 10^x for x between 0 and 5.

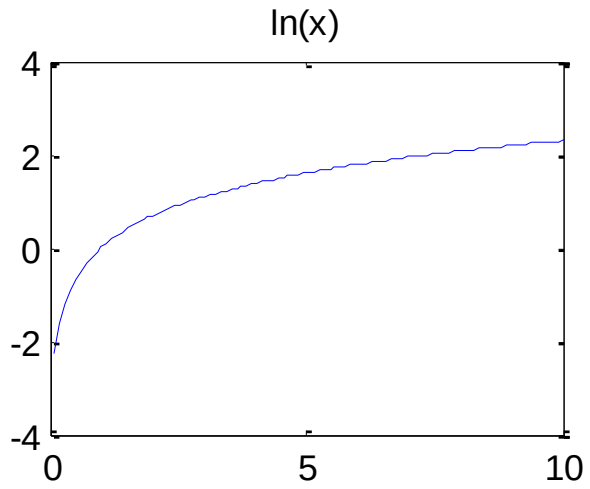
Use 100 points for the x vector so your plots are smooth. Add titles to each subplot.

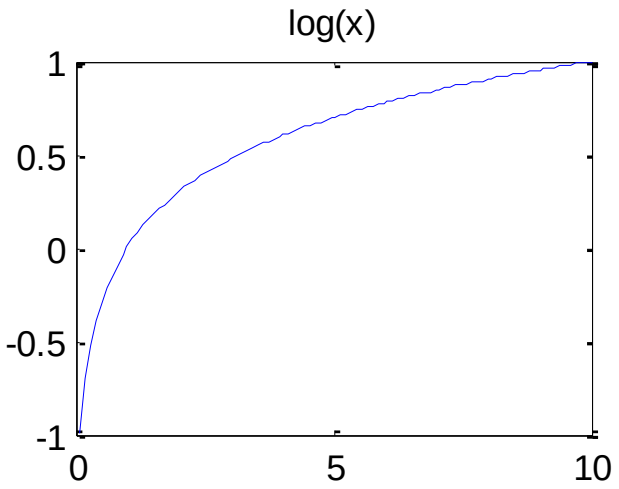
Exercise

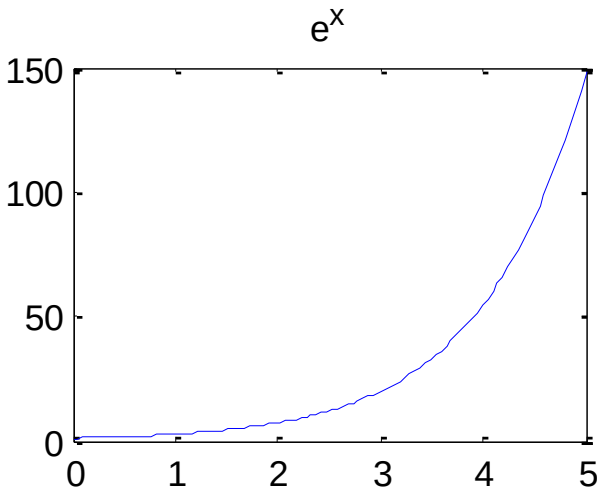
```
% Exercise
x1 = linspace(0, 10, 100);
y1 = log(x1);
y2 = log10(x1);
x2 = linspace(0, 5, 100);
y3 = exp(1).^x2;
y4 = 10.^x2;
```

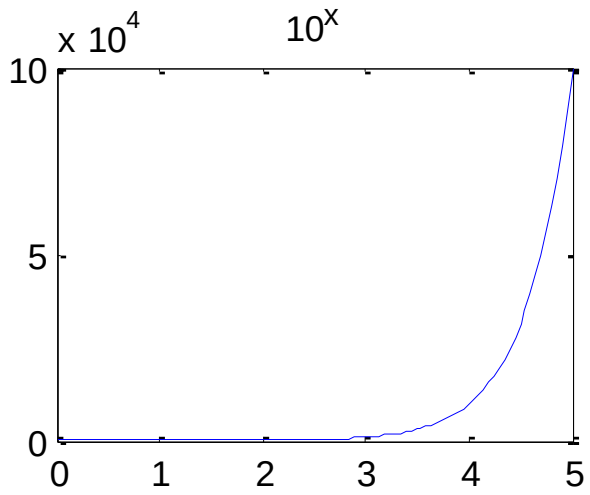
```
subplot(2,2,1);
plot(x1,y1);
title('ln(x)')
subplot(2,2,2);
plot(x1,y2);
title('log(x)');
subplot(2,2,3);
plot(x2,y3);
axis([0 5 0 150]);
title('e^x');
subplot(2,2,4);
plot(x2,y4);
axis([0 5 0 10e4])
title('10^x')
```

Exercise


ln(x)
4
2
0
-2
-4
0
5
10


log(x)
1
0.5
0
-0.5
-1
0
5
10

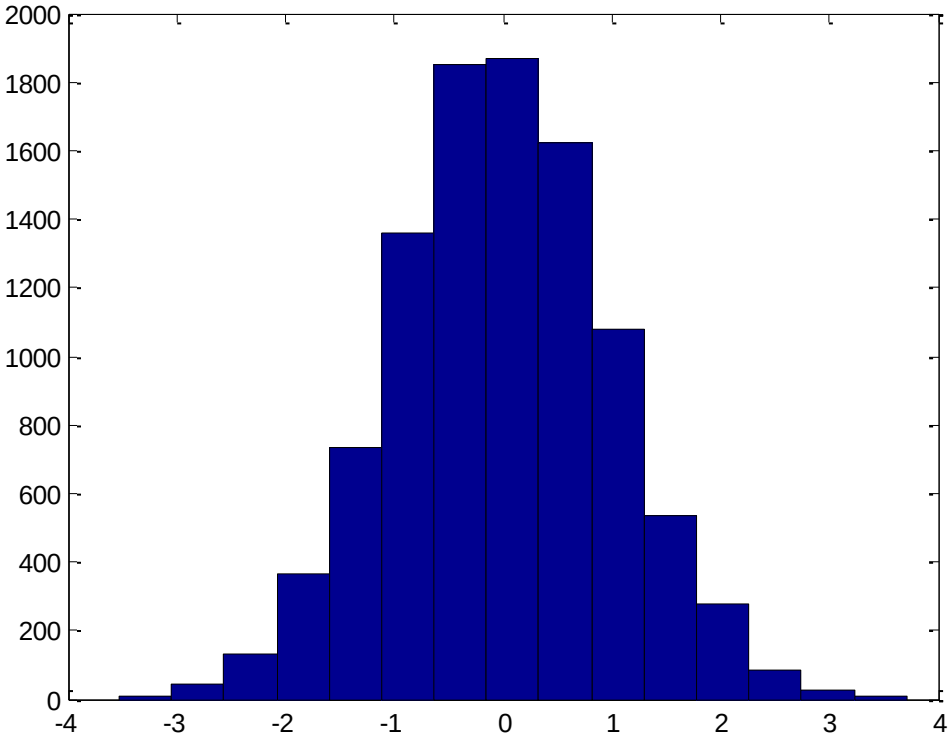

e^x
150
100
50
0
0
1
2
3
4
5


x 10^4
10^x
10
5
0
0
1
2
3
4
5

Histogram

- Histogram – plot showing the distribution of values within a data set.
- The range of values within the data set is divided into evenly spaced bins, and the number of data values falling into each bin is determined.
- hist(x) creates and plots a histogram with 10 equally spaced bin.
- hist(x, nbins) creates and plots a histogram with nbins.

Example



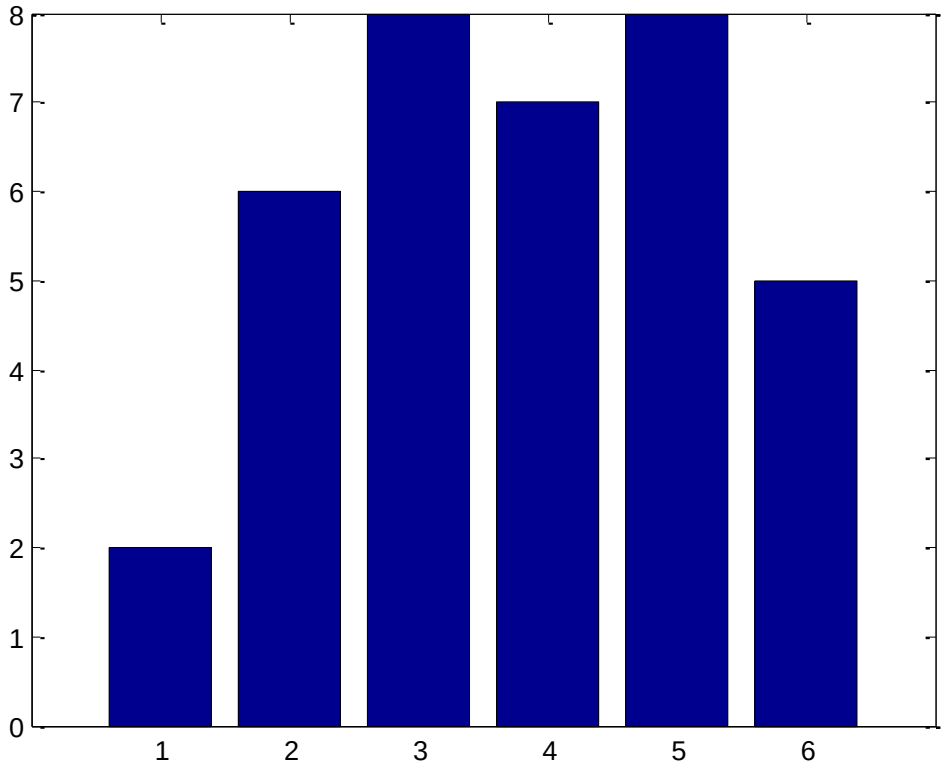

```
x = randn(1,10000);
hist(x, 15)
```

The Bar Plot

bar(x,y) creates a vertical bar plot, with the values in x used to label each bar and the values in y used to determine the height of the bar.

```
x = 1:6;
y = [2 6 8 7 8 5];
bar(x, y)
```

The Bar Plot

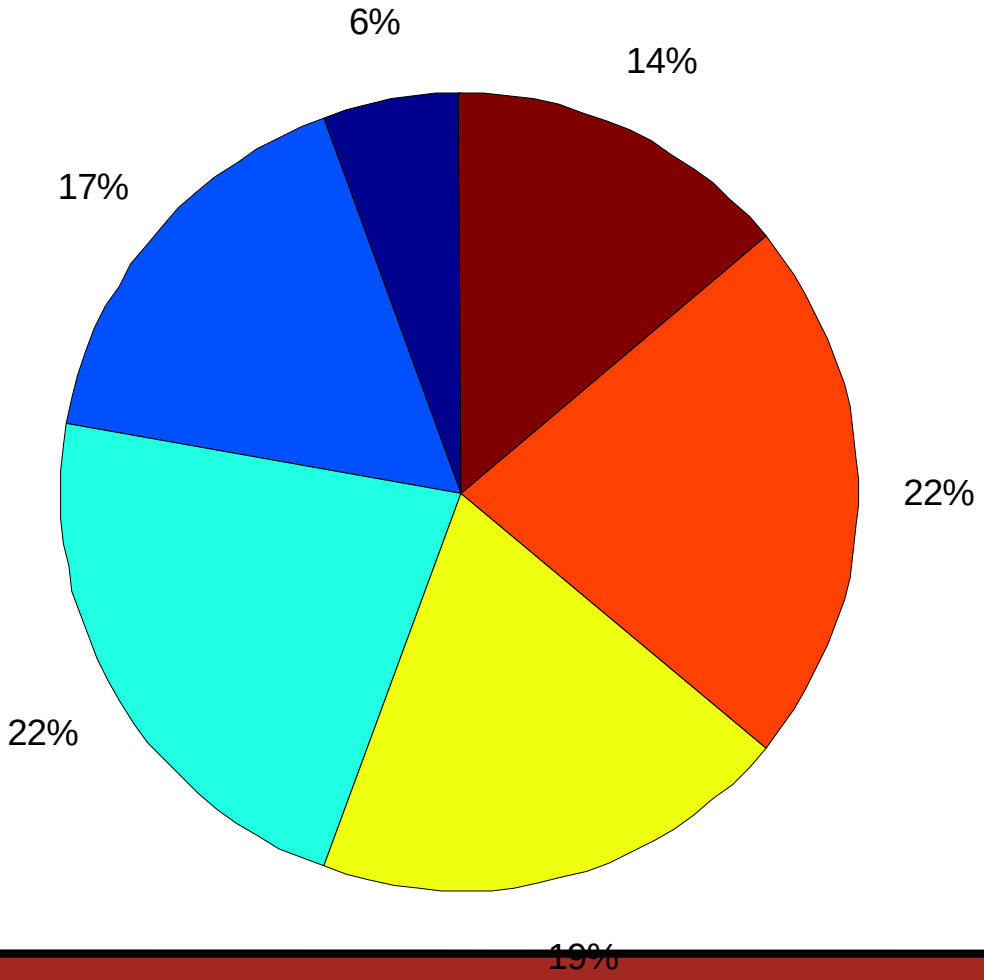


The Pie Plot

pie(x) creates a pie plot. It determines the percentage of the total pie corresponding to each value of x and plots pie slices of that size.

```
y = [2 6 8 7 8 5];
pie(y)
```

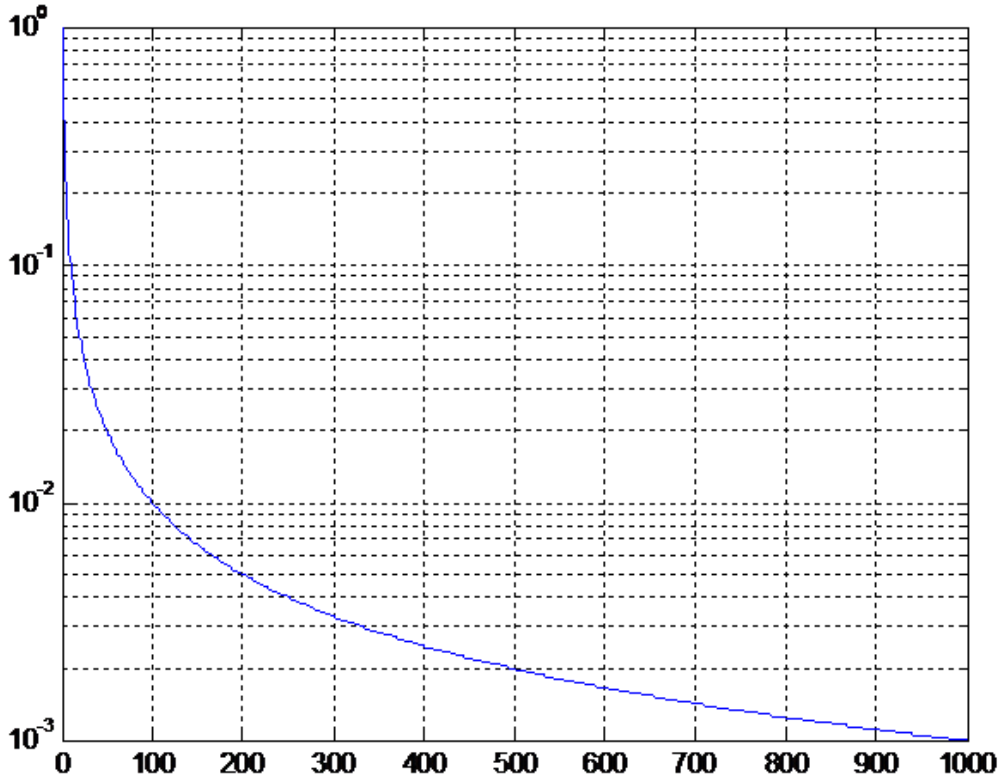
The Pie Plot



Plots with Logarithmic Axes

semilogy(x,y)
semilogx(x,y)
semilogxy(x,y)

```
x = 1:1000;
y = 1./x;
semilogy(x,y)
grid on
```

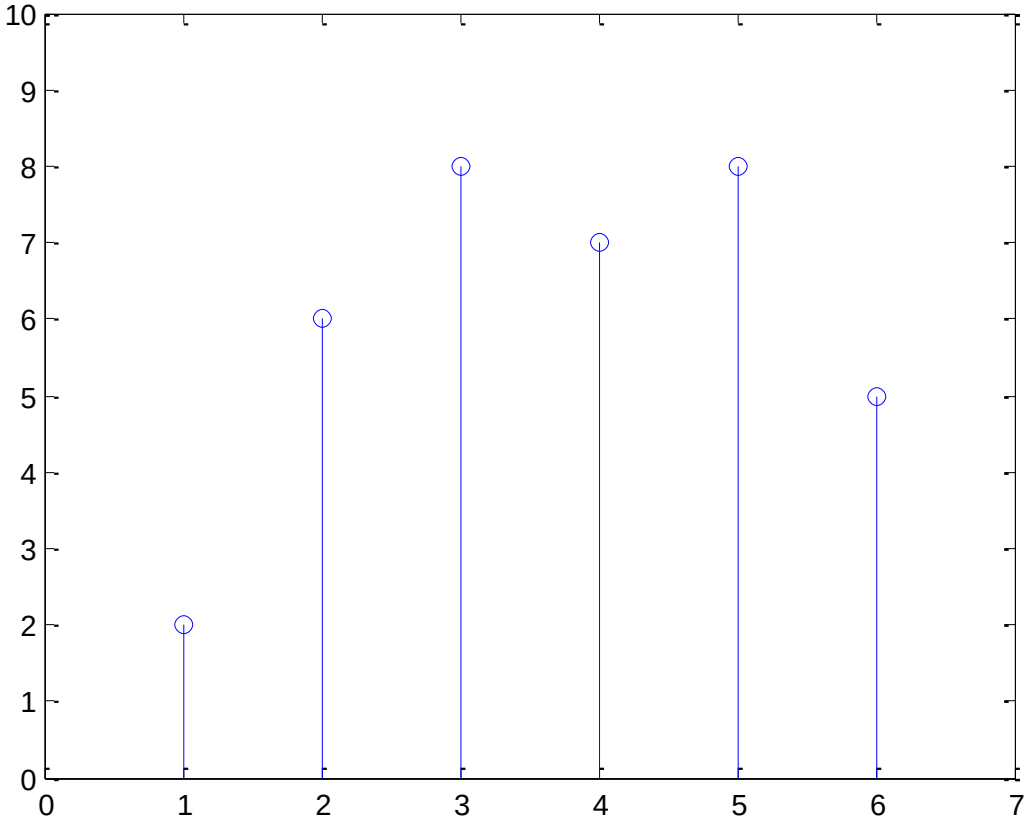


The Stem Plot

stem(x,y) creates a stem plot with a marker at each (x,y) point and a stem drawn vertically from that point to the x axis.

```
x = 1:6;
y = [2 6 8 7 8 5];
stem(x, y)
axis([0 7 0 10])
```

The Stem Plot

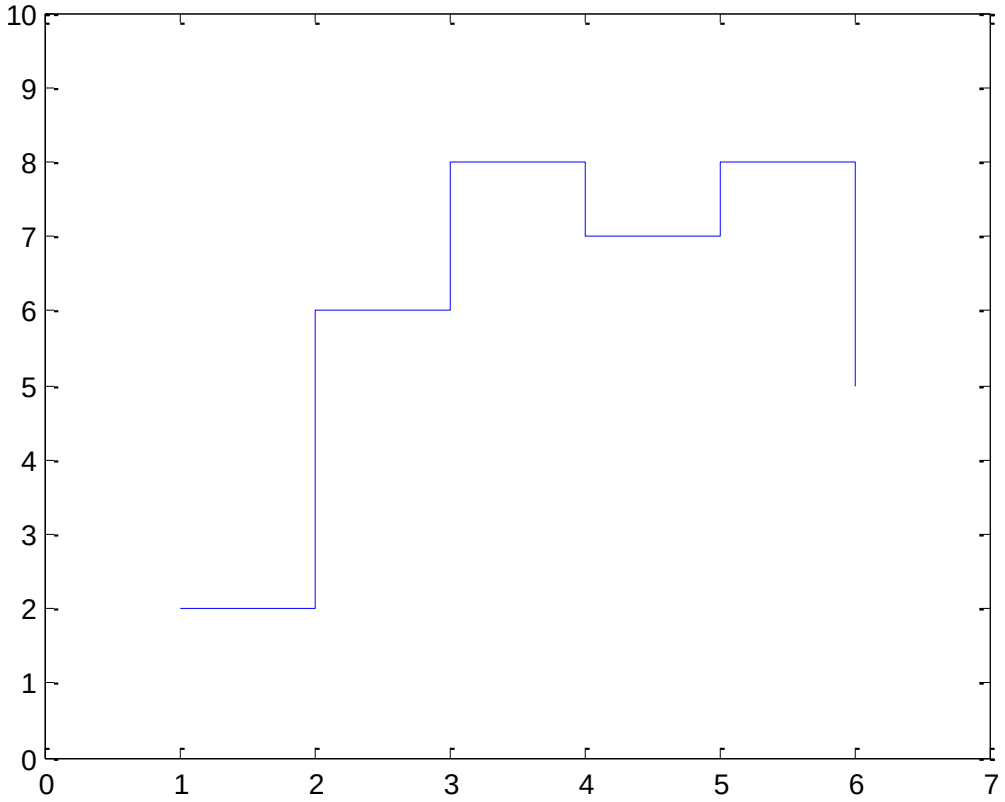


The Stairs Plot

stairs(x,y) creates a stair plot, with each stair step centered on an (x,y) point.

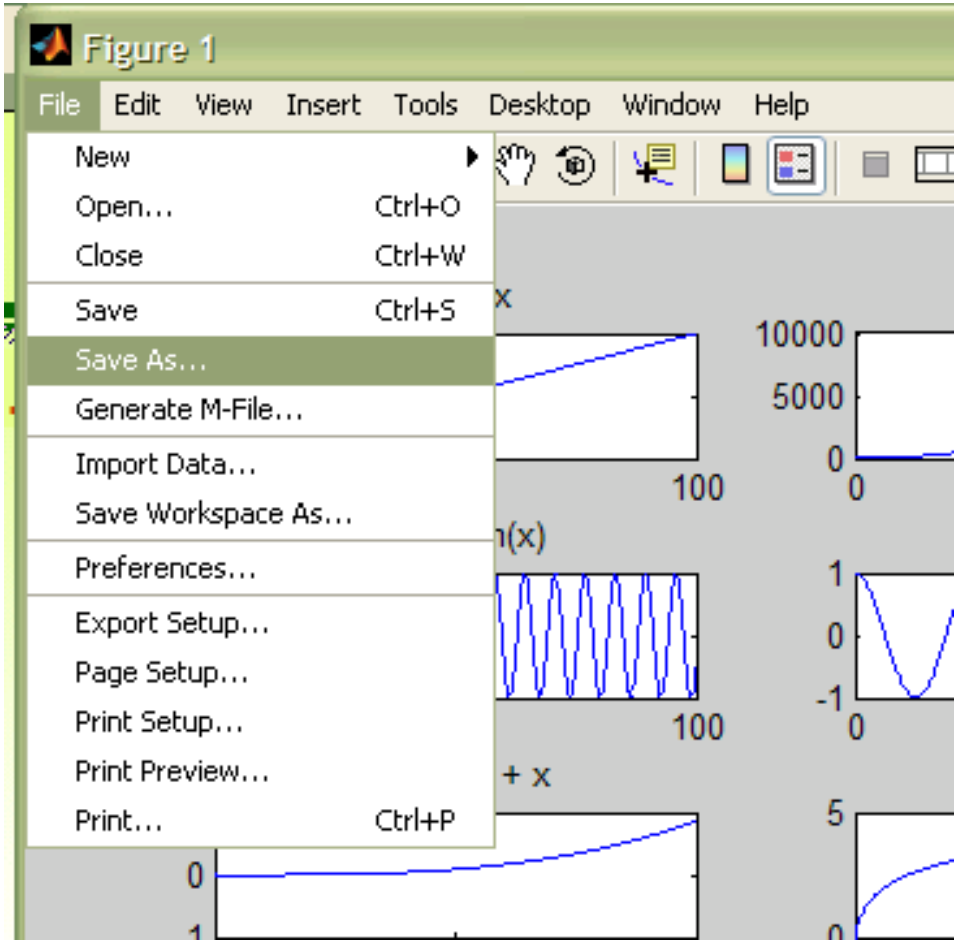
```
x = 1:6;
y = [2 6 8 7 8 5];
stairs(x, y)
axis([0 7 0 10])
```

The Stairs Plot



Saving Figures

1. Use the Save As option in the Figure Menu.



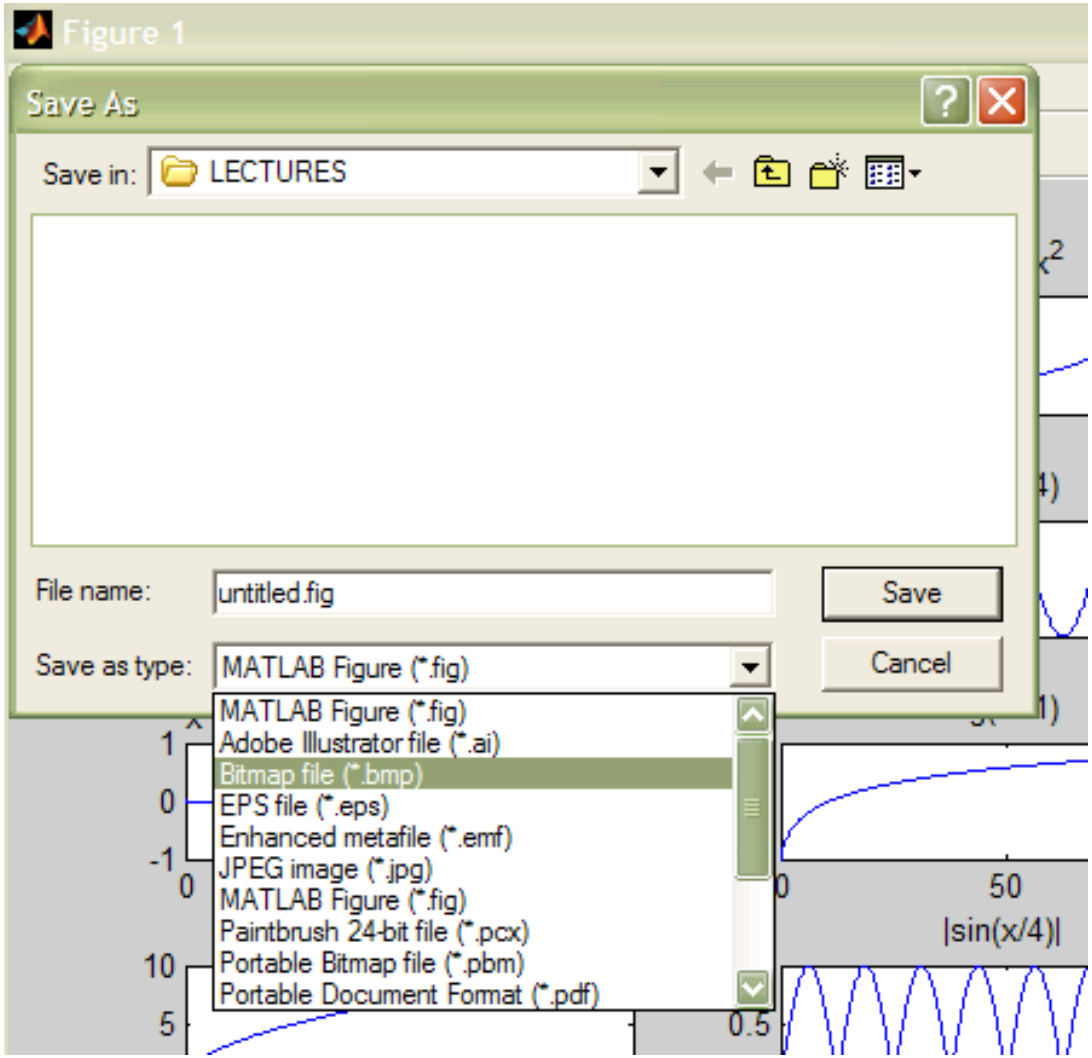


Figure 1
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Bitmap file (*.bmp)
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Enhanced metafile (*.emf)
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Portable Bitmap file (*.pbm)
Portable Document Format (*.pdf)
|sin(x/4)|

Saving Figures

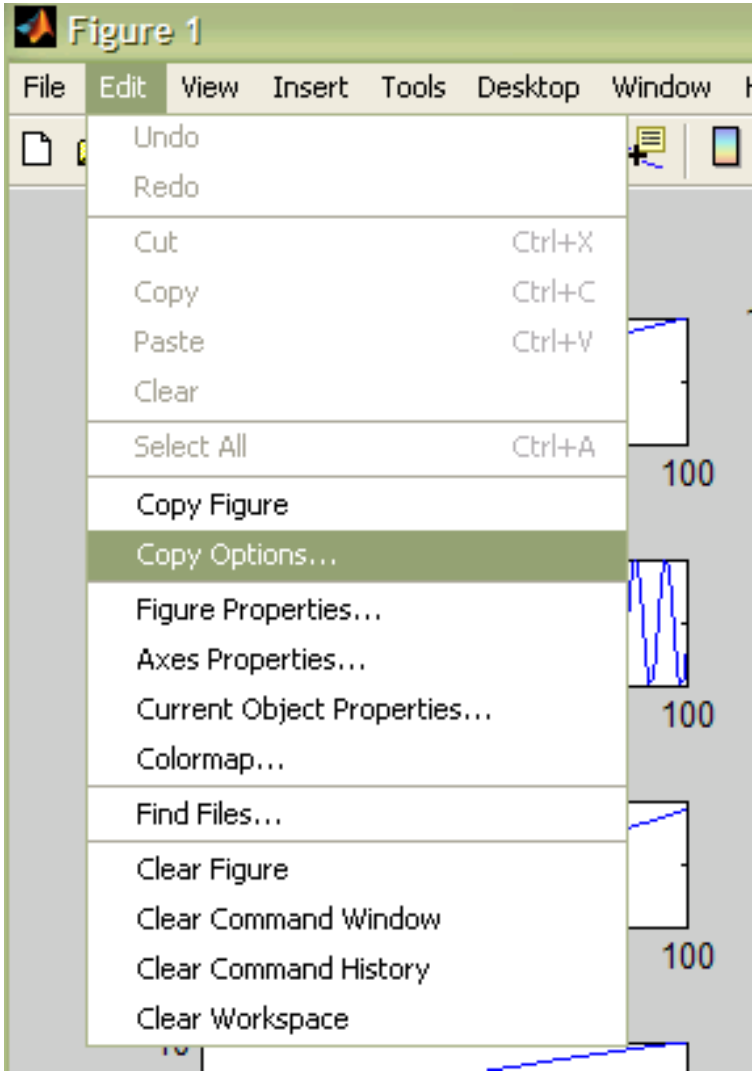
2. Use the print command:

print <options> <filename>

```
print -dbmp Plot1.bmp
```

Saving Figures

3. Use the Copy option in the Figure Menu.



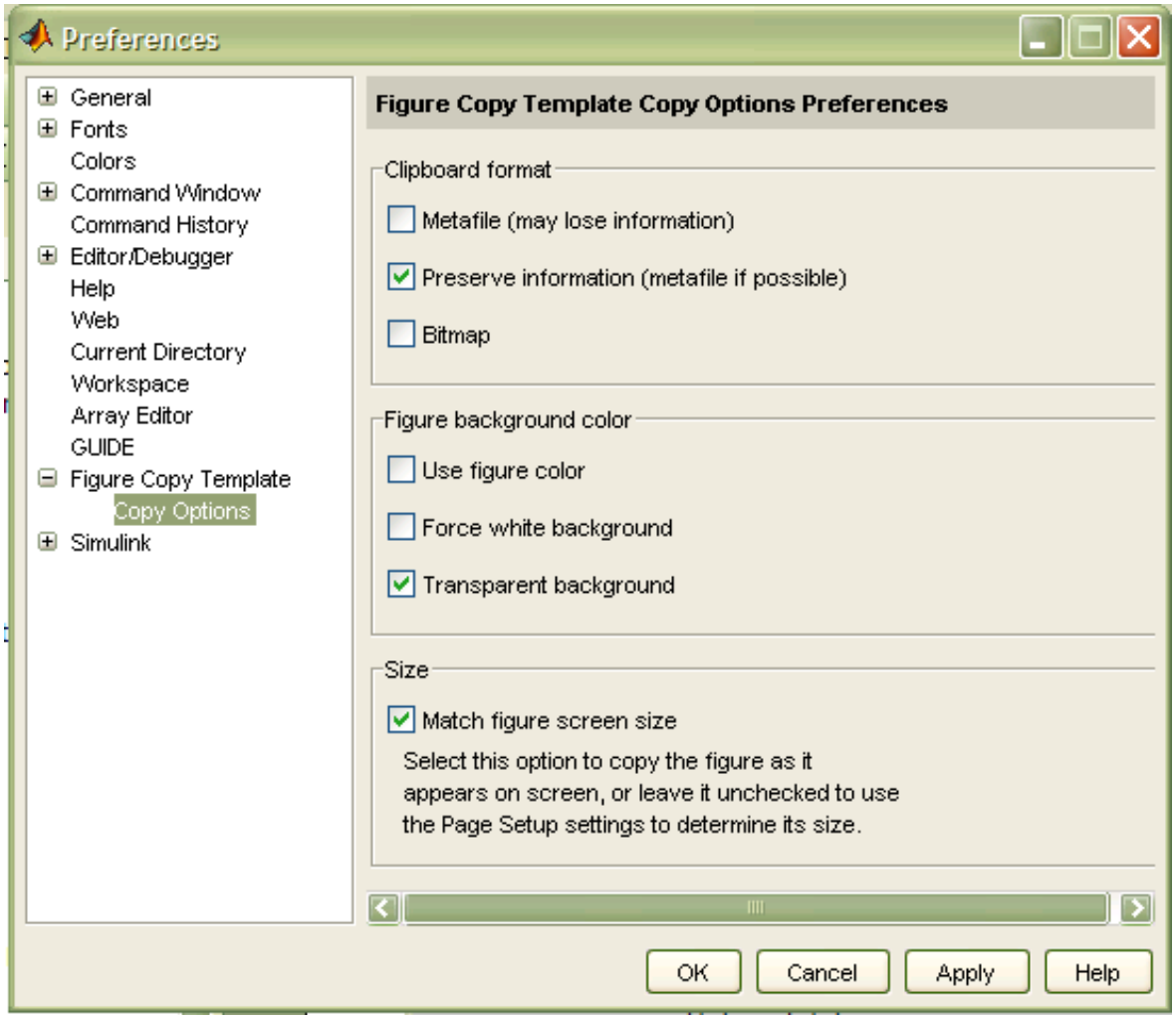

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Figure Copy Template Copy Options Preferences
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Preserve information (metafile if possible)
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Force white background
Transparent background
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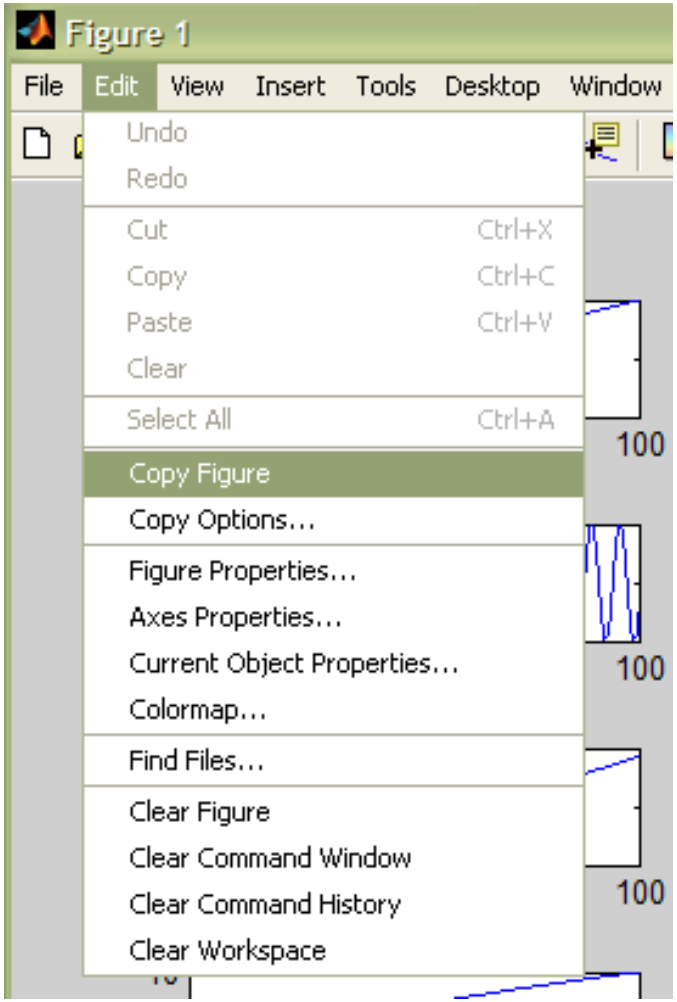
Figure 1
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Current Object Properties...
Colormap...
Find Files...
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Saving Figures