

A Short Matlab Tutorial

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Starting Matlab

Start -> All Programs -> Matlab -> R2006b -> Matlab R2006b

Entering Data

In the command window type:

```
volt=[0.1,0.2,0.3,0.4,0.5];  
current=[11.5,22.5,32.5,40.6,48.1];
```

To verify data entered:

In command window type:

```
volt  
current
```

or Click on Workspace tab.

Alternate Method of Entering Data (text file)

You can write a space delimited file by hand or using a c-program into a text file.

Example:

```
u:\data.txt  
0 1  
2 3  
3 4  
5 6
```

In Matlab read in the data by typing:

```
v=dlmread("u\data.txt")
```

To see the data was read in type:

```
V which prints out the data
```

```
size(v) which answers 5 2 so the data is in a 5x2 matrix
```

Alternate Method of Entering Data (excel)

You can type your data into an Excel file and import it into Matlab quite easily. In Excel enter the volt and current data into columns A and B respectively. Then save the excel file.

In Matlab set the current directory at the top of the page to the directory where your Excel file is located.

In the command window type:

```
volt=xlsread('data.xls','Sheet1','A1:A300');  
volt=volt(:);
```

Here the data in sheet1 column A from the Excel file data.xls is read into a column vector f. We are used to using row vectors so the second command converts it into a row vector. To get the current data you continue with the commands.

```
current=xlsread('data.xls','Sheet1','B1:B300');  
current=current(:);
```

Data Manipulation

To Add/Subtract

In command window type:

```
a=volt+0.1;  
a  
s=volt-0.1;  
s
```

To Multiply/Divide

In command window type:

```
m=volt*10.;  
m  
d=volt/10.;  
d
```

More complex expressions

In command window type:

```
f=log(volt);  
f
```

Plotting Data

For a data plot, in the command window type:

```
plot(current,volt,'r');
```

To change the marker size type:

```
h= plot(current,volt,'r');  
set(h,'MarkerSize',20);
```

For a line plot, in the command window type:

```
plot(current,volt,'r');
```

The third argument to plot is the graphic specification. A list of options is given in the Graphic Plot Specifications Appendix at the end of this document.

For a loglog plot, in the command window type:

```
loglog(current,volt,'b');
```

For a semilog plot, in the command window type (either):

```
semilogx(current,volt,'b');  
semilogy(current,volt,'b');
```

To add modified axis, in the command window type:

```
axis([0.0 60.0 0.0 0.6]);
```

To add labels, in the command window type:

```
xlabel('current(ma)');  
ylabel('voltage(V)');  
title(' Voltage vs Current for the 50.1 Ohm Resistor');
```

Histogramming Data

For a histogram plot, in the command window type:

```
x=[0.1,0.2,0.1,0.3,0.5,0.2,0.2,0.2,0.1]
```

```
hist(x,5);
```

or specify the binning:

```
bins=[0.1,0.2,0.3,0.4,0.5];  
hist(x,bins);
```

Bar Graph (similar to Histogram)

For a bar graph, in the command window type:

```
x=[0.1,0.2,0.3,0.4,0.5];  
w=[0.2,2.,4.5,2.,0.];  
bar(x);  
bar(x,w);  
bar(x,w,1);  
set(gca,'XLIM',[0.5,0.65]);  
bar(x,w,1);
```

Execution File (.m Files)

Tab to the current directory window. Right click the mouse and choose New-> M.FILE. Modify the name to xxx23. In the M-FILE editor type in the lines.

```
volt=[0.1,0.2,0.3,0.4,0.5];  
current=[11.5,22.5,32.5,40.6,48.1];  
error=0.03*volt+.01;  
errorbar(current,volt,error,'r.');
```

```
axis([0.0 60.0 0.0 0.6]);  
xlabel('current (ma)');  
ylabel('voltage (V)');  
title('V vs I 50 Ohm Resistor');  
lv=[0.1,0.5];  
lc=[11.5,48.1];  
hold on  
plot(lc,lv,'b');  
hold off
```

Save the resulting file, and in the command window, type xxx23. A plot should appear.

Fitting

As the quarter progresses we will be fitting data to obtain the best values for parameters extracted from the data. When we get to more complex fits you can refer to examples I have put on the class web page.

Appendix 1 -Graphic Plot Specifications

Specifier	Line Style
-	Solid line (default)
--	Dashed line
:	Dotted line
-.	Dash-dot line

Marker Specifiers

Specifier	Marker Type
+	Plus sign
o	Circle
*	Asterisk
.	Point
x	Cross
'square' or s	Square
'diamond' or d	Diamond
^	Upward-pointing triangle
v	Downward-pointing triangle
>	Right-pointing triangle
<	Left-pointing triangle
'pentagram' or p	Five-pointed star (pentagram)
'hexagram' or h	Six-pointed star (hexagram)

Color Specifiers

Specifier	Color
r	Red
g	Green
b	Blue
c	Cyan
m	Magenta
y	Yellow
k	Black
w	White

