CIEG 675
Homework #3 Due **Wednesday March 4, 2009**

In a m-file do the following and verify it works by copy and pasting into the command window or running your m-file.

1) Make a sine wave of your choice and plot it as a function of time.
2) Make a parabola of your choice ($y=ax^2$) and plot it. Then overlay two more parabolas using 1/2a and 2a. Change the color and linetype for each. Add legend.

Matlab has a command called **ginput** that allows you to use a cross-hair on a plot to determine the coordinates of a location. >>**ginput** alone lets you click with the mouse until you hit enter. >>**ginput(n)** lets you click n times before returning results to the screen.

Matlab has a command called zoom that you can type at the command line >>**zoom**. When you do this, you can click the plot to zoom into that area. You can also use the magnifying glass icon at the top of the figure window where you can draw a box using the mouse to zoom in on a particular area.

A trick for looking for zero is to overlay a grid on the plot. Type >>**grid on**

3) Develop a variable that looks like $y = 2x^{1.01} + \sin(3\pi x/2)-10\cos(x)-3$ where x varies between 0 and 10 at increments of 0.1. Plot y as a function of x and then determine, using ginput, the location of the first 2 zeros of your function.

4) You have collected two beach profile data sets (in meters) that looks like the following and you want to make a nice plot to present in a journal article. Do your best to make this plot. Note that titles are not normally appropriate for journal articles but put one on your plot anyway.

```
Profile1x = 1:10;
Profile1z = [3 2.2 1.5 0.5 0.1 -0.4 -0.8 -1.4 -1.9 -2.2];
Profile2x = 1:10;
Profile2z = [2.9 2.3 1.5 0.4 0.1 -0.3 -0.6 -1.3 -1.9 -2.3];
```

So far we have only looked at plotting 2d data. Matlab can also do many other types of plots. We will look at surface and other plots later, but in this problem explore the command **plot3** which plots three-dimensional (x,y,z) data sets as dots.

5) Make a plot with the following surface data points. Add axis labels and a title, change the color to something other than blue and change the symbols to something other than dots (>>**help plot** will show what all possible symbols are).

```
x = 1:10;
y = x;
[X,Y]=meshgrid(x,y);  % makes a mesh of the x and y data
Z = cumsum(ones(size(X))) + (1-rand(size(X)));  % a surface of data

%% note that this is not very neat and we will earn about surface plots and color options later.
```

Another command that matlab uses for plotting is **plotyy**. I will state here that I do not care for this command that much. **plotyy** is used to plot 2 data sets with the same abscissa but ordinates that different significantly in magnitude.

6) Explore the **plotyy** command for the following data sets (again you can always use >>**help plotyy** to get assistance on its usage). Note that it is not trivial here to change the plot colors and linetypes. That is why I rarely use this command.

```
x = 1:10;
z1 = [3 2.2 1.5 0.5 0.1 -0.4 -0.8 -1.4 -1.9 -2.2];
z2 = [97 84 63 32 7 -4 -21 -45 -68 -133];
```

7) Using the data from problem 4: make 2 subplots (1 column of subplots) and plot each profile in one of the subplots. Then using **set** and **get** commands and their options turn off the x-axis tick labels in the upper plot (that means set them to []) where [] means empty. Add axis labels as appropriate but do not put one on the axis where you removed the tick labels.

8) Develop a variable y = log(x) where x goes from 1 to 5000. Then in 2 subplots plot the data. In the first, plot it on a log scale (y axis only) and in the second plot it on a log scale (both axes). Label axes.