EE322 Fall 2012: Lesson 4/PS04

Introduction to MATLAB, Chapter 4: Plotting.

Refer to your book to perform the following problems. There are sections of Chapter 4 that specifically address problems like these.

1. Create a time vector that runs from 0 sec to 4 sec in 50 msec increments. Using this time vector, create three signals:

$$f_1(t) = e^{-2t}\cos(2\pi t), \quad f_2(t) = e^{-t}\sin(2\pi 2t), \quad f_3(t) = (1-e^{-0.5t})\cos(2\pi 0.5t)$$

   Plot all of these signals on the same plot with <u>one</u> *plot* command. The signals should appear as follows:
   $f_1(t)$ to be a solid red line with circles at each sample point
   $f_2(t)$ to be a dotted blue line with diamond at each sample point
   $f_3(t)$ to be a dashed green line with squares at each sample point

   On your plot, include labels for both axes (using *xlabel* and *ylabel*), a title, turn on the grid (using the *grid* function), and include a legend (using the *legend* function).

2. Generate 5,000 samples of Gaussian random noise (*randn* function) that has a mean value of 5 and a standard deviation of 0.15. (See the top of page 82 in Chapter 3 to see how to generate this data). Suppose these values are measurements of voltage across a resistor in a DC circuit over a one-week period.

   Find the mean and standard deviation of the values you generated. Create a histogram plot (use the *hist* function) for the data using 50 bins. Label the axes and give the plot an appropriate title. Do you see the bell shape of this curve? Why is it not a smooth bell shape? What does the histogram tell you?

3. Ch. 4, problem 1. Note that some required information for problem 1 is provided on the previous page.

4. On a number of occasions, you will be asked to put more than one plot in a single figure window. This is done using the *subplot* command. In addition, there will be times when the data you are dealing with has a large dynamic range (that is, it has very large values along with very small values). In these cases, a linear plot causes the large values to dominate the plot, and any trends in the small values cannot be seen on the plot. A logarithmic plot will sometimes help you to analyze the data better.

   Create a time vector t that runs between 0 sec and 50 sec in 50 msec increments. Create a signal y defined as:
   $y(t) = 5t^{2.5}$
   Generate 4 subplots in one figure of the function y (on the y-axis) vs. t (on the x-axis): (1) linear in t/linear in y, (2) linear in t/logarithmic in y, (3) logarithmic in t/linear in y, and (4) logarithmic in t/logarithmic in y. Show the grid in each plot.