EE322 Fall 2012: Lesson 3/PS03

Introduction to MATLAB, Chapter 3: MATLAB Functions.

Use your Introduction to MATLAB book to help you perform the following:

1. If x = [1 2 3], what is x.^2? What is e^x? What is x.^x? Why won't MATLAB let you calculate x^2?

2. Based on Example 3.1, generate a plot of saturation vapor pressure (y-axis) vs. temperatures (x-axis) for temperatures from -85° F to + 220°F in 2°F increments. Remember labels and print out your plot.

3. Find the maximum and minimum value of $f(t) = 3 \sin(2\pi 110t) \cos(2\pi 11t) + 0.25$ over the time interval from 0 to 0.5 sec. When creating the time vector, use a step size of 1 μsec.

4. Determine how many integer values there are if you start counting at -1105 and stop counting <u>before</u> you get to +713, when you only count every 17th integer. Create a vector and use the length function to determine your answer.

5. Generate 2000 <u>uniformly</u> distributed random numbers between 0.0 and 1.0. What is the average (mean) value of these numbers? The standard deviation? (See the section on uniform random numbers, p. 80). Note: if you're not careful in how you use the *rand* function, you will create a matrix of 2000x2000 values (4 million), and it will cause your computer to balk.

6. Generate 2000 Gaussian distributed random numbers with a mean value of -2.75 and a standard deviation of 10.35. Using MATLAB's *mean* and *std* (standard deviation) function, determine the average (mean) value of the random numbers that MATLAB generated. Determine the standard deviation. How closely did the actual mean and standard deviation get to the desired mean and standard deviation? Note: if you're not careful in how you use the *randn* function, you will create a matrix of 2000x2000 values (4 million), and it will cause your computer to balk. Hint: *randn* generates Gaussian values with a mean of 0 and a standard deviation of 1. See the top of page 82 to learn how to adjust the generated mean and standard deviation of a set of Gaussian values.

7. Enter the following command into MATLAB to create a variable called x:

   ```
   x = eye(5)
   ```

   Now describe what each of the following commands create, in terms of x:

   ```
   y1 = x(:)
   ```

```
y2 = x(1:3,1:2)

y3 = sum(x)

y4 = x(:,5)

y5 = fliplr(x)

y6 = sum(x(:))
```

8. Type the following commands:

```
z = peaks;
figure(1),surf(z)
```

The function *peaks* is a built-in MATLAB function that creates an interesting matrix of values, and surf is a way to view matrices of values as 3d surface plots.

What are the dimensions (size) of z?

Use the colon command to extract the 19th row from matrix z, and plot it.

What is the minimum and maximum value of the 19th row of z?

9. What is 1/0? What is 1/∞? What is ∞/∞? What is 0/0? What is NaN?

10. Chapter 3, problems 8-10.

Turn in this worksheet, your plot from problem 2, and the table from problem 10.