EE322 Fall 2012: Lesson 5/PS05

Introduction to MATLAB, Chapter 5: Control Structures and Chapter 6: Matrix Computations.

1. Section 2.4.3 in Chapter 2 introduces you to allowing users to input values into your program using the *input* function. Use that section as a guide to perform the following:

   In communication receivers, noise plays an important role in how well the system works. In a receiver, noise power can be calculated as:

   $$N = kTB$$

   Where N is noise power in Watts, k is Boltzmann's constant (1.38×10^{-23} Joules/K), T is the noise temperature in °K, and B is the receiver bandwidth in Hz).

   Write a program that will prompt a user to input the noise temperature in °K and the receiver bandwidth in Hz, and the program will compute noise power in Watts and display "xxx watts", where xxx is the computed value of power. Use your program to compute noise power if noise temperature is 297 K°K and bandwidth = 140 kHz.

   Noise power = _____ W

2. Section 3.6 in Chapter 3 deals with writing functions in MATLAB. Write a function called *MaxDistance* that will compute the maximum radio frequency (RF) communication distance between two antennas. The max communication distance (in miles) between an antenna with height h_1 feet and another antenna with height h_2 feet is given by:

   $$d = \sqrt{2h_1} + \sqrt{2h_2}$$

   Your m-file called *MaxDistance.m* should have comments after the *function* line to let the user know how to use the function (an example was provided in the EE322 Course Policy Statement).

   Use your function to compute the max transmission distance between an aircraft carrier (antenna height 148') and a submerged submarine (antenna height 17').

   Distance = _____ miles

3. Use a *for* loop (section 5.3.1) to print out a table of max communication distances between the aircraft carrier from problem 2 and antennas that vary from 10 ft to 30 ft, in 2 ft increments. Print out this table line by using the *fprintf* function (introduced in Section 2.3.3). These values will be printed in the command window, with the first column being height and the 2nd column being distance.

4. Work Problem 6.14. For part (b), you can download the *elements.dat* file from the course website.