ENGR 160 Algorithms and Applications Sec 02 Spring 2018

Homework Assignment #4 Due 9:10am Feb 2 (F)

Read Chapter 3 of the book through section 3.6 (pgs. 75 – 101). Work through the examples and practice problems given in the book. You do not have to submit any of this work. For the following problems, use MATLAB Editor Window to write your algorithms (pseudo code) and the script files. Begin each program (script file) with comment lines as shown below, followed by the algorithm pseudo code, also as comments. The first executable statement in your program is to be **clear** to ensure that you have nothing saved in memory. Next write the MATLAB program statements to solve the problem.

Problem 4.1

In the metric system, fluid flow is measured in cubic meters per second (m3/s). A cubic foot per second (ft3/s) is equivalent to 0.028 m3/s. Write a script titled flowrate that will prompt the user for flow in cubic meters per second and will print the equivalent flow rate in cubic feet per second. Here is an example of running the script. Your script must produce output in exactly the same format as this:

```
>> flowrate
Enter the flow in m^3/s: 15.2
A flow rate of 15.200 meters per sec is equivalent to 542.857 feet per sec
```

Problem 4.2

A file **"realnums.dat"** has been created for use in an experiment. However, it contains real numbers and what is desired instead is integers. Also, the file is not exactly in the correct format; the values are stored column-wise rather than row-wise. Write a script that would read from the given file realnums.dat into a matrix, round the numbers, and write the matrix in the desired format to a new file called "**intnums.dat"**, and run your program with the given data file, show the results of running your script file.

Problem 4.3

Create and run a MATLAB script to solve Exercise 21 of Chapter 3. Run your program using the attached partdiam.dat as input data file, show the results of running your program.

Problem 4.4

Create and run a MATLAB script file to solve Exercises 35 of Chapter 3. You do not need to use a function. Show the results of running your program.

Problem 4.5

An exponential decaying sinusoid has very interesting properties. In fluid dynamics, for example, the following equation models the wave patterns of a particular liquid when it is perturbed by an external force: $y(x) = F\, e^{-ax} \sin(bx)$, where F is the magnitude of the external impulse force, and a and b are constants associated with the visocity and density, respectively. The following data have been collected for the following types of fluids:

Fluid	a value	b value
Ethyl Alcohol	0.246	0.806
Water	0.250	1.000
Oil	0.643	1.213

Write a script that prompts the user for a value for F. Then, create an x-vector with 100 evenly spaced numbers between 0 and 2π, and then calculate the y-vector using the above equation. Plot the wave pattern of a fluid when perturbed for the three different fluids; plot using the values above and compare them when F=5.