ENGR 250 Numerical Methods using MATLAB
2015 Winter Quarter

Homework Assignment #2

Due : January 28th (Wednesday)

You should submit your M-file, named **HW2_yourEmailAccount**, by email "pandrist@greenriver.edu"

1. Celcius to Fahrenheit Table

Write a m-file that converts Celsius temperature to Fahrenheit temperatures. The formula is

$$F = \frac{9}{5}C + 32$$

'F' denotes the Fahrenheit temperature and 'C' means the Celsius temperature. Use loops ('*for*' and '*while*') to display a table of the Celsius temperature and their Fahrenheit equivalents.
Make following dat files and submit them.

- save a table ($-20°C \leq$ C $\leq 150°C$ with ΔC $= 0.5°C$, and their Fahrenheit equivalents) on **HW2_1.dat** file (This result should have two rows and the top row is for Celsius.)
- save equivalent Fahrenheit for Celsius C= $-7.75°C$ on **HW2_2.dat** file (You don't need to use the for or while loop. Answer should be a single scalar)
- save equivalent Fahrenheit with Celsius C= $92.725°C$ on **HW2_3.dat** file

2. Building a Box

We want to build a box. Material for the box costs \$2 per square foot. The box's dimensions are given by l, w, and h.

For the following 3 problems, generate a matrix containing 3 rows. The first row is the box's surface area, the second is the box's volume, and the third, its cost.

- $l = 2ft, w = 3ft, 0ft \leq h \leq 10ft, \Delta h = 0.5ft$. Save matrix on **HW2_4.dat**
- $l = 4ft, w = 5ft, 0ft \leq h \leq 6ft, \Delta h = 0.5ft$. Save matrix on **HW2_5.dat** file
- $l = 8ft, w = 7ft, 0ft \leq h \leq 2ft, \Delta h = 0.5ft$. Save matrix on **HW2_6.dat** file

3. Function for Box Building

In the previous problem, you calculated the surface area, volume, and cost of a simple box. Now, make a function m-file named **buildbox** which accepts three parameters, the dimensions of the box, and returns a 2 element vector containing first the cost and then the volume of the box. Use the same material costs as in the previous problem. With your own function m-file, make the following dat files.

- Calculate the cost and volume of a 3 ft x 4 ft x 2 ft box . Save on **HW2_7.dat**
- Calculate the cost and volume of a 2 ft x 6 ft x 2 ft box . Save on **HW2_8.dat**
- Calculate the cost and volume of a 19 ft x 38 ft x 27 ft box . Save on **HW2_9.dat**
- Calculate the cost and volume of a 20 ft x 4 ft x 2 ft box . Save on **HW2_10.dat**

4. Membership Fees Increase

A country club, which currently charges $2,300 per year for membership, has announced it will increase its membership fee by 5.25% each year for the next six years. Write a program that uses a loop to display the projected rates for the next six years. Save them on **HW2_11.dat** file. (The first element should be $ 2300 and the size of the final answer should be 1 by 7.)

5. Calculation of Series

Calculate the summation of the following series for proving if the series are convergent.

$$f = \frac{1}{1} + \frac{1}{3} + \frac{1}{6} + \frac{1}{10} + \frac{1}{15} + \frac{1}{21} + \cdots = 2 \quad (1)$$

$$g = \frac{1}{1} + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \frac{1}{32} + \cdots = 2 \quad (2)$$

Make a program to calculate above series. Your m-file must use 'for' or 'while'. Make the following dat files and submit them.

- save f with 100 iterations on **HW2_12.dat** file
- save g with 100 iterations on **HW2_13.dat** file
- save f with 500 iterations on **HW2_14.dat** file
- save g with 500 iterations on **HW2_15.dat** file
- save f with 750 iterations on **HW2_16.dat** file
- save g with 750 iterations on **HW2_17.dat** file

- save f with 1000 iterations on **HW2_18.dat** file
- save g with 1000 iterations on **HW2_19.dat** file
- save f with 100000 iterations on **HW2_20.dat** file
- save g with 100000 iterations on **HW2_21.dat** file