MATH 259 – Assignment 1
Due: 01.05.2017 at 23:59

1) Implement a function named "plotpint" for plotting (i) an n^{th} degree polynomial p, (ii) the integral of p with integral constant c=1, and (iii) the derivative of p <u>in the same plot</u>. The function should be defined as follows:

   function plotpint (coef, x1, x2, numpoints)

   where

   a) coef is a row vector of size n+1 which stores the coefficients of p (coef[1] is the coefficient of the term x^0 and coef[n+1] is the coefficient of the term x^n in p.
   b) [x1, x2] is the interval on which the graph would be plotted;
   c) numpoints is the number of data points to be plotted (should be linearly spaced).

   Your plot should contain a title, labels for two axes and a legion. The data points should also be marked. Note that <u>you are not allowed to</u> use built-in functions for taking derivative and integral of p.

2) Write a script named funcplot that plots the following function on interval [pi, 6*pi] using 2000 linearly spaced data points.

   $$f(x) = 3*\sin (x^{(3*x)}/x)*\tan(\ln(3*e^{(0.2*\sin(x))}*x))$$

Note that you are not allowed to use syms function (symbolic function definition) and any loops in your script! Use array operators.

3)
   a) Implement a function named "mypi" which approximates the value of pi using Monte Carlo simulation. The function should be defined as follows:

      function zpi = mypi (numpoints)

      where

      - numpoints is the number of points that will be used in the simulation.

   b) Write a script named ploterr which plots the absolute error between zpi and the real value of pi for 200 linearly spaced numpoints value between 10 and 10000. The plot should contain a title, labels for two axes. The data points should also be marked.

4) a) Find the derivative of the function given in Question 2 at x = pi for h = 0.01, 0.1, and h=1 using two points, three points and five points method discussed in the lecture.

   b) Find the definite integral of the function given in Question 2 from 1.8 to 3.2 for h = 0.01, 0.1, and h=1 using Trapezoidal rule, Simpson's rule and Simpson's 3/8 rule discussed in the lecture.

   Present your results in a) and b) in two separate tables.

SUBMISSION POLICY OF THE ASSIGNMENT

1. You can work in groups of two.

2. Write a detailed report which includes explanation about for each question and options of each question. Write how your scripts and functions work, i.e., which parts of your scripts/functions accomplish which task and how it is accomplished. Put also your functions and scripts' outputs into your report.

3. Write test scripts for the questions in which there exists creation of your inputs and call of your scripts/functions.

4. Put your report, Matlab codes, plots etc. into a zip file. Name your zip file as your name_surname_studentnumber_hw1.zip. For example, a student whose name is Kaan Demir and student number is 150119099 will name the file as: kaan_demir_150119099.zip. Also, write your name, surname and student number as comments at the beginning of your codes.

5. To submit your homework, send your zip file to serap.korkmaz@marmara.edu.tr. Write the name of the zip file to subject part of your e-mail.

6. Write explanatory and sufficient comments on each line of your codes and indicate your inputs and outputs if exist.

7. Show your own work and keep away from plagiarism.