###### Information and Computer Science Department

**ICS 103: Computer Programming in C**

**Second Semester 2018-2019 (182)  
Homework No. 2  
[Posted: Thursday February 14 ]  
[Due Date: Sunday February 24 @ 11:59 PM (Before Midnight)]**

**Submission Guidelines:**

Submit a zipped file containing the following files:

* HW1.c (C source file) containing your answer to the programming question.

**PLEASE DO NOT INCLUDE .EXE FILES IN YOUR SUBMISSION**

The zipped file should be named as follows:

**HW\_2\_XXXXXXXXX\_YourFamilyName\_Lecture\_Section\_No.zip**

where:

XXXXXXXXX is your 9 digit KFUPM ID.

YourFamilyName is your family name

Lecture\_Section\_No is the number of your ICS 103 lecture section

Submission should be made through your ICS 103 Lecture section Blackboard course page under **HW\_1 Assignment** submission link.

**Important Notes:**

* Submission of the homework solution should be in a zipped filed with the format specified above. **Any different formatting/naming will result in reducing the total homework score by half!**
* **Submitting exe file only without the source file leads to 0 grade**
* **Cheating is taken seriously**. Any cheating attempt will result in 0 for this homework and the remaining ones.
* **EACH STUDENT IS REQUIRED TO DO THE HOMEWORK ALONE**. COPYING FROM ANY SOURCE IS REGARDED AS CHEATING.
* **No late submissions are allowed**.
* **Submissions via email are not accepted and will be simply ignored**.
* **You must use proper indentation and meaningful variable names in your programs.**

In this problem, you will use **Bisection method** to find a root of a polynomial.

Write a C program to find a root of a cubic polynomial p(x)=a x^3 + b x^2 +c x +d=0 in the interval [-50,50] if it exists. You program will first prompt for and read the coefficients a, b, c, and d of the polynomial.

**Step#1:** Locate the interval [x0,x1] containing the root as follows:

- fix x0 to -50 . Also initialize x1 to -50

- for each value of x starting from -50 to 50 with increment of 1

* If |p(x)| < epsilon -> display the value of x as the root and stop.
* If p(x)\*p(x0)<0 -> assign x to x1 and get outside the loop (using break statement)

**Step#2:** Finding the root:

* After the loop, if x1 is still -50 -> display “No root found inside [-50,50] “ and terminate
* If not -> The root is in the latest interval [x0,x1]. Then apply the following bisection procedure method:
  + Compute xm=(x1+x0)/2 which represents the middle of the interval [x0,x1]
  + While |p(xm)| >= epsilon
* If p(x0)\*p(xm) < 0 -> root between x0 and x1, so x1 = xm
* if p(xm)\*p(x1) <0 -> root between xm and x1, so x0 = xm
* update xm=(x0+x1)/2
* Display the value of the root found and the number of iterations (repetitions) to obtain the root.

Note: Define epsilon as a constant with a value = 1E-6

Below are 3 sample runs





