Homework 4

COT4500 – Spring 2020

REPL

Your programming code should be done using the https://repl.it website. Click the "**Sign up**" button on the home page and create an account. You can use the free version of REPL, but your code will be visible to anyone on the internet that knows your REPL username. Therefore, you should not give out your username to other students. After you have created an account and logged in, begin by selecting "**my repls**" at the top, then click the "**New Repl**" button. In the "search for a language, e.g. c++" dialog box, enter "**c**" and then click the link titled "**C: Low-level and cross platform imperative language.**" A default name for your program is automatically generated using a random combination of words. You should change the name to something that will make it easy for you to remember. Erase any program templates created for you by REPL, and begin entering your program. REPL automatically saves your code as you type. It might be convenient if you copy and paste your code into a file on your machine when making significant changes so that you can return to the previous code if needed. When you have finished coding your program, click "Run" and verify that the output is correct. Click the "**share**" button, and copy the share link that is given such as **https://repl.it/@username/HW4-Q1**.

Homework Submission

Homework is to be submitted using Webcourses. For each homework question, you should write a separate program. Create a single Word document (or PDF file) that contains links to all the solutions of the questions. For example, a typical Word document might contain the following:

> First-name Last-name
> NID: xx999999
> COP4500 - Spring 2020
>
> Homework #1
> Q1: https://repl.it/@username/ HW4-Q1
> Q2: https://repl.it/@username/ HW4-Q2

Submit the Word document in Webcourses before the due date and time. It can take a significant amount of time writing computer programs, especially when learning and correcting mistakes. You are advised to start several days before the due date. You can develop you programs locally on your own computer or laptop using almost any C compiler, but it must be compile on REPL to be submitted. **Note:** REPL is using gcc version 4.6.3 and does not fully support the C11 standard. Be careful that some compilers also provide functions and capabilities that are not found in REPL.

Comments and Style

Use the following style comment block at the top of each of your programs:

```
// Homework 4 - Question 1
```

You must include comments in your code. You will lose points if it is not commented, or if there are not enough comments. You should not comment every line though. Too many comments make the code more difficult to read. For now, the comments indicate you understand what the code is doing. Later, we can assume the reader knows C and comments are used only to point out things that may not be obvious, like starting a loop at 1 instead of 0. So, at this point, be liberal with your comments. It is often easier to read if your comments are above the line they reference, rather than at the end of line, especially if the comment causes line wrapping. Your code should be formatted using the conventions of the textbook and lecture examples.

Grading:

Try to fix all errors before submitting your assignments. If there is any compile time error in your program, your score for that question will be a maximum of 30%, depending on the number of errors.

Q1: (Bisection method): Write a program to find solutions accurate to within 10^{-2} for $x^3 - x^2 + 2 = 0$ on interval [-200,300]. Use the Bisection method to solve this problem. The output should look like below.

The procedure was successful.
The value of root is : -1.0025

If the method failed to find the root, the output should be like below.

The method failed after 20 Iterations.

Q2: (Fixed-Point iteration method): Write a program to find solutions accurate to within 10^{-2} for $x^3 - x^2 + 2 = 0$ on interval [-200,300]. Use the Fixed-point iteration method to solve this problem. The output should look like below.

The procedure was successful.
The value of root is : -1.0025

If the method failed to find the root, the output should be like below.

The method failed after 20 Iterations.

Q3: (Newton's method): Write a program to find solutions accurate to within 10^{-2} for $x^3 - x^2 + 2 = 0$ on interval [-200,300]. Use the Newton's method to solve this problem. The output should look like below.

The procedure was successful.

The value of root is : -1.0025

If the method failed to find the root, the output should be like below.

The method failed after 20 Iterations.