Alexandria University
Faculty of Engineering
Computer and Communications
Engineering – SSP
7th Semester

Numerical Analysis
Fall 2021

Due date: 11:59 PM 5/12/2021

Project 1

Objective:

The aim of this assignment is to compare and analyze the behavior of numerical methods studied in class {Bisection, False-position, Fixed point, Newton-Raphson, Secant}.

Description:

You are required to implement a root finder program which takes as an input the equation, the technique to use and its required parameters (e.g. interval for the bisection method).

Specification:

The program must contain the following features:

- An interactive GUI that enables the user to enter equations containing different functions such as: {poly, exp, cos, sin}. Reading from files must be available as well.
- Differentiation and Parsing is your task.
- A way to choose a method to solve the given equation.
- A way to enter the precision and the max number of iterations otherwise default values are used,
    Default Max Iterations = 50, Default Epsilon = 0.00001;
- The answer for the chosen method indicates the number of iterations, execution time, all iterations, approximate root, and precision.
- Compute the theoretical bound of the error for the methods.

Marks Breakdown:

- Project Runnability.
- Results Correctness.
- Error Handling.
- Discussion. (individually marked)
- GUI.
- Report.

Report Content:

- Flowchart or pseudocode for each method.
- Data structure used and how helpful was your choice.
- Analysis for the behavior of different examples using the analysis template, and your conclusion about the behavior of each method (at least three examples).
- Problematic functions and the reason for their misbehavior and your suggestions (if they exist).
- Sample runs and snapshots from your GUI.

Notes:

- You should work in team of max. 3.
- Send your project with the report at the email :

Bonus:

- Single step mode simulation showing the iterations on the drawn function for one method of choice.
- Highly Friendly-User GUI.