Project #1
Course: CS301

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Write programs for all the methods (Bisection, Newton-Raphson, Secant, False-Position and Modified Secant) for locating roots. Make sure that you have clever checks in your program to be warned and stop if you have a divergent solution or stop if the solution is very slowly convergent after a maximum number of iterations.
Use your programs to find the roots of the following functions and plot three graphs for each one of the functions. The first graph should plot the given function. Use any plotting software. This will give you the idea of the root/s of the function. The first graph should show the true percent relative error (y –axis) vs. the number of iterations (x-axis) for all the methods (only if the true root is given to you in the problem) and the second graph should show a similar plot but using the approximate percent error instead of the true percent relative error.

(a) $f(x) = 2x^3 - 11.7x^2 + 17.7x - 5$
       This function has 3 +ve roots, all of which lie between 0 and 4. Find the roots. Implement the methods until $e_a < 1\%$. Let the maximum iterations be 100. For the modified secant method, use d = 0.01. Plot the graphs for the approximate % relative error for different roots. Each graph should have 5 error curves, one for each method.

(b) $f(x) = e^{-x} - x$
       For this function, plot true % relative error if the true root is 0.56714329. Use $x_0 = 1$ and d = 0.01 for modified secant method. Figure out the other point for the other methods.

Points distribution: 10% for each program, 25% for the write-up and

25% for the plots

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Due Date: To be announced in class

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What to hand in:

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Write a report that shows the print outs of all the tables for each methods and the graphs as well. Talk about the starting points and convergence to the root for the different methods used.
Point out any interesting/strange behaviors you might observe while using these numerical methods. Comment on the data types used to calculate the roots in your program.

Staple your report with the print out of your code. Make sure to have a separate first page that has your name, course name and project number on it and hand it in on the due date in the beginning of the class. Also upload to blackboard under project 1 (in assignments), a folder which has all the code and executable, word document of your report and other documents like plots (say in excel or other software). Also upload a page that talks about how to run your programs that is if they need any starting values and where to provide them

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