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**CS301.01**

**Project 2**

Report:

I tested my methods using intervals [0,1], [1,2], and [3,4] for the first equation, and [120, 130] for the second equation. As shown in the result, Secant and Newton have the worst convergence behavior. In the second equation, Newton convergent to the root extremely slow. I have to choose the starting point at 126.6 to make it convergent to the root with ea < 0.00001 in 100 iterations, which the root is 126.63351346432101. False Position and Bisection have moderate behavior on convergence. No matter what starting points I choose, as long as they convergent, they will convergent in a linear time shown in the graphs. Although they are not very fast, they are very reliable. Modified Secant performs the best convergence among the 5 methods. It has the least number of points on the graphs, which means it convergent really fast to ea < 0.00001.

For the Bisection method, I found it interesting that there were some certain points on the Et versus Iteration graph that looks like a wave. It did not perform a smooth curve like other methods, although the overall behavior is the same. It might be caused by the error term. The error might be big or small when doing the a = error + a equation. The error makes the result away from the root at a certain point. When the method find it not correct and do error = error / 2, it comes back onto the track again.

In this project, I used double data type for all of the methods. Since it provides the most accurate results in computers, I can make my ea < 0.00001, which gives me a moderate amount of iterations to include in the graph. I have not tested float yet, but I think it might have some difference in the result than double because of the range and the number of decimal places.

I cannot include the data table here because of the format and the amount of data. I will include the whole Excel Graph + Data in the Zip file.