Numerical Analysis of Solutions to Equations
University of California Davis
Spring 2023
Prof. Stefan C. Schonsheck

Coding Report 1

Due April 17

1 Problems(100 pts)

For this chapter, you will write adaptable scripts for the bisection method, fixed-point method, Newton's method, and the secant method and do some tests to evaluate their performance. Begin by writing a function named `my_fun`, which returns $f(x)$ for a given input x and one named `my_fun_deriv`, which returns the derivative of $f(x)$ at x. Then write functions called `Bisection`, `Fixed_Point`, `Newton` and `Secant`, to compute the zeros of f and output the sequence of p_ns used by the method.

Consider the equations: $f_1(x) = \frac{1}{2}\sin((x-1)^3)$ and $f_2(x) = 6^{-x} - 2$. Plot each of these functions to get an idea the shape of the function. Then, for each method listed above, compute the an approximation of root to an accuracy of atleast $1e^{-8}$ and create a table of the absolute errors. Note: **You only need to find the smallest positive root of f_1**

You must determine appropriate starting points and report them.

Then, on a single graph, show the convergce of each method for f_1 by ploting the absolute error (y-axis) at each iteration (x-axis). Repeat this for a log-log plot. Then do the same for f_2. **You should have four plots in total each of which has four lines representing one of the four methods**. Make sure that the plot has a legend and that the lines are readable (appropriately thick and different colors or textures to differentiate the methods)

Attach the code for `my_fun`, `my_fun_deriv`, `Bisection`, `Fixed_Point`, `Newton` and `Secant` at the end of your report.

2 Collaboration

Please use this space to recognize any and all collaborations that assisted you in the completion of this assignment.

3 Academic Integrity

Please copy and sign the following statement of academic integrity:

On my personal integrity as a student and member of the UCD community, I have not given nor received any unauthorized assistance on this assignment.