Assignment 6

Math 528L Fall 2021

Due 10/10 (Sunday at 11:59 pm)

1   Newton's Method: Matlab

(a) Write a program to find the root of an arbitrary function $f(x)$ using Newton's Method. Define some tolerance level and an upper number of iterations to use. Also add a break command in case you "hit" the root (you get so close that the computer treats it like zero).

(b) Find the root of $f(x) = e^{-x} - 1$ with initial guess $x_1 = 1$. For this let $tol = 10^{-8}$ and $N_{max} = 50$ (tolerance and maximum number of iterations). You should find that $x^* = 0$. At each iteration keep track of the error $|c - c_n|$ for the next part.

(c) Plot the graph of $\log(error_{n+1})$ vs $\log(error_n)$. What is the slope of the line (approximately)?

(d) Repeat the above steps but for $f(x) = x^3$.