

HOMEWORK II
NUMERICAL METHODS
MATH 375
FALL 2025

DUE FRIDAY, SEPT. 19

Instructions: Consider the following root finding problem.

Computer/MATLAB. Use Newton's method to approximate, to within 10^{-4} , the value of x that produces the point on the graph of $y = x^2$ that is closest to $(1, 0)$.

Hint: Minimize $[d(x)]^2$, where $d(x)$ represents the distance from (x, x^2) to $(1, 0)$.

Main tasks:

- a) Derive by hand the problem that needs to be solved in the form of $f(x) = 0$.
- b) Review the way the Pseudo-code is given on page 67 (Burden 10ed). They have an output for both success and failed iterations. Your code should be an improved version over what we covered in class and this mentioned Pseudo-code. In other words, polish up your code.
- c) Implement Newton's method with $x_0 = 2$. How many iterations does it take for the method to converge?
- d) To help understand the solution given by Newton's method, provide a graphical representation of what was found. Describe your findings.

Note: The programming should be done in terms of a Script and a function file in Matlab. Your submission should include a folder named "YourLastName" that contains 1) a .txt file with basic instructions/description of your script.m and your function.m file 2) script.m file and 3) function.m file. It is important to compress your folder before submitting it on Canvas. Try something like Winzip or Winrar. Report should be uploaded and viewable on Canvas for grading and comments purposes.

Note1: Show all your work.

Note2: Yes, we will be running your codes.

Note3: Include a readme file (even it is a simple description - 1 sentence is okay).

Note4: Whenever possible provide graphical representation of your results to validate claims/summaries.