

# Assignment 1

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MAS365 Introduction to Numerical Analysis

Fall 2021

Prof. Chang-Ock Lee

Due date: Mar. 27 (Mon), 2021

Note: Put your homework in KLMS before the beginning of the class. If you did computer programming work, hand in your code and results in KLMS before the beginning of the class, too. For the plotting work, use MATLAB.

1. Write a program to use the bisection method to solve for the root of  $\tan \theta = e^\theta$  in the interval  $[0, \pi/2]$ . Terminate the program when the relative difference between two consecutive iteration is less than  $10^{-3}$ .
2. (a) Apply the fixed point iteration to the function  $x - f(x)$  to attempt to find approximate zeros of  $f(x)$ , starting at  $p_0 = 11.6$  and performing 4 iterations in each case:
  - (i)  $f(x) = 2552 - 30x^2 + x^3$
  - (ii)  $f(x) = (2552 - 30x^2 + x^3)/(-300)$
- (b) In each of the preceding two cases, explain, based on the theory of fixed point iteration, why the method “works” or “fails”.
3. Do the problem 2 using Newton’s method.
4. Use the globalized Newton’s method to approximate a zero of  $f(x) = 1/x^3 - 10$  to three decimal places.