

**24-703/12-703 Numerical Methods in Engineering S25 Homework 3**  
**Due 12 February 2025, 10:00AM**

**Problem 1** (20 points) Write a program to find the roots of a single non-linear equation. For a given function, your program should be able to:

- ❖ Identify bracketed regions that enclose a root so as to generate initial guesses.
- ❖ Iterate using Newton's method to the root to within a given tolerance.
- ❖ Find all roots in one execution.

Use your program to find the real roots of the following two equations to within  $10^{-6}$ . Submit your code and the generated output.

(i)  $\sin x + \ln x = 1$  ;

(ii)  $e^x + x^2 = 3x + 2$  .