Third year BS (Honors) Lab 2024-2025
Department of Applied Mathematics, University of Dhaka
Course code: AMTH 350, Title: Math Lab III (Matlab)
Assignment 01
Topics: Numerical Methods

Name: **Roll:** **Group:**

Day 1 & 2 (19 Nov, 2025 & 26 Nov, 2025)

1. Find the root of the function $f(x) = x - cosx$ on the interval [0,1] using bisection method with tolerance 10^{-5}.

2. Find the root of the function $f(x) = x^3 + 4x^2 - 10$ on the interval [1,2] using fixed point iteration method and the following functions.

   For each case, use $x_0 = 1.5$. If the method converges, use tolerance 10^{-4}.

   a) $g_1(x) = x - x^3 - 4x^2 + 10$
   b) $g_2(x) = \sqrt{\frac{10}{x} - 4x}$
   c) $g_3(x) = 0.5\sqrt{10 - x^2}$
   d) $g_4(x) = \sqrt{\frac{10}{4+x}}$
   e) $g_5(x) = x - \frac{x^3+4x^2-10}{3x^2+8x}$

3. Values of the function $f(x) = xe^x$ are given in the following table:

x	1.8	1.9	2.0	2.1	2.2
$f(x)$	10.889365	12.703199	14.778112	17.148957	19.855030

   a) Construct a forward difference table and approximate $f(1.95)$.
   b) Use Lagrange interpolation formula to approximate $f(1.95)$.
   c) Use the appropriate three-point and five-point formulas to approximate $f'(2)$.

Day 3 (3 Dec, 2025)

4. a) Use the composite Trapezoidal rule to find approximations to $\int_0^{\pi} \sin x \, dx$ with $n = 1, 2, 4, 8$ and 16.
   b) Then perform Romberg extrapolation on this results and find $R_{5,5}$.

5. The linear system $Ax = b$ given by

$$4x_1 + 3x_2 = 24$$
$$3x_1 + 4x_2 - x_3 = 30$$
$$-x_2 + 4x_3 = -24$$

   Solve the system of equations by Jacobi method and Gauss-Seidel method using $x^{(0)} = (1,1,1)^T$ and tolerance 10^{-5}.