

MA-221(Numerical Analysis)
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Lab Assignment-6
Date: 18/03/2025

1 Problem: Real Solution using Fixed-Point Iteration Method

Problem Statement: Find the real solution for the following system of nonlinear equations:

$$y^2 = \cos(x) \quad (1)$$

$$y = xe^x \quad (2)$$

Use the **Fixed-Point Iteration Method** with an initial guess of $x_0 = 0.5$, $y_0 = 0.7$. Perform iterations until the error is less than 10^{-6} .

2 Problem: Complex Solution using Newton-Raphson Method

Problem Statement: Find all complex roots of the equation:

$$F(z) = z^3 - (1 + 2i)z^2 + (3 - i)z - 2 = 0 \quad (3)$$

where z is a complex number. Use the **Newton-Raphson method** by decomposing the function into its real and imaginary components and solving the resulting system. Start with different initial approximations $z_0 = 1 + i$, $z_0 = -1 + i$, and $z_0 = 0 - i$ to find all roots. Perform iterations until the error is less than 10^{-6} .

3 Problem: Solution of a Linear System using Matrix Inversion

Problem Statement: Solve the following system of linear equations using the **Matrix Inversion Method**:

$$2x + 3y + z = 7 \quad (4)$$

$$4x + y - 2z = -1 \quad (5)$$

$$x - y + 3z = 5 \quad (6)$$

Express the system in **matrix form** $\mathbf{AX} = \mathbf{B}$, compute A^{-1} , and determine X .