Department of Mathematics
Indian Institute of Technology Guwahati
**MA322: Lab Assignment 1**

**Date of Submission: 20/01/2022**

---

1. Write a MATLAB program implementing the Bisection method and Newton-Raphson method (NRM) to compute the smallest positive root of the equation $f(x) = 0$, where $f(x) = e^{-x} - \sin x$.

   - Use the Bisection method to compute the approximate root of $f(x) = 0$ correct to five decimal places. Note the number of iterations is needed to achieve this accuracy.
   - Print the approximate solutions as per the following format.

| Iteration | Bisection Method |
|---|---|
| 1 | |
| 2 | |
| $\vdots$ | |

2. Write a program which uses fixed-point iteration to find the zero of the function $f(x) = x^2 - x - 2$ in the interval $[0, 7]$. Take the iteration function $g(x) = \sqrt{x+2}$ and the starting point $x_0 = 0$. Terminate the programme when the following error tests are satisfied

$$\frac{|x_n - x_{n-1}|}{|x_n|} < TOL \quad \text{or} \quad |f(x)| < TOL,$$

   with $TOL = 10^{-3}$. Print the output as per the following format.

| $x_n$ | $f(x_n)$ | Error |
|---|---|---|
| $x_1$ | | |
| $x_2$ | | |
| $\vdots$ | | |