Numerical Methods Practical
LAB #1

1. Using the algorithm of **Bisection Method**, write a program to find out the root of the following equations.

a. x^2- 4x – 10 = 0 **b. 4sinx = e^x**

Also display the number of iterations required in this method.

2. Using the algorithm of **False Position Method**, write a program to find out the root of the following equations.

a. x^2- 4x – 10 = 0 **b. xtanx-1 = 0**

Also display the number of iterations required in this method.

ALGORITHMS:

Bisection Method:

1. Take the initial values of x1 and x2 and stopping criteria, E
2. Compute **f1=f(x1)** and **f2=f(x2)**
3. Check whether the product of **f1 & f2** is negative or not.

If it is positive take another value for x1 and x2

If f1*f2 is negative then proceed to step (4).

4. Determine:**x0 = (x1+x2)/2**
5. If((f1*f0)>0),

X1=x0 ;

Otherwise**,** **x2=x0**.

6. Check whether absolute value of ((x2-x1)/x2) is greater than 'E' or not;

If yes go to step (4); otherwise proceed to step (7).

7. Display the value of root as : x0

False Position Method:

1. Take the initial values of **x1 and x2** and stopping criterion, E
2. Compute **f1=f(x1)** and **f2=f(x2**)
3. Check whether the product of **f1 & f2** is negative or not.

If it is positive take another value for **x1 and x2**

If f1*f2 is negative then proceed to step (4).

4. Determine:

$$x0 = \frac{x1 * f2 - x2 * f1}{f2 - f1}$$

f0=f(x0)

5. If **((f1*f0) <0**),

x2=x0& f2=f0;

Otherwise**,**

x1=x0 & f1=f0.

6. Check whether absolute value of f(x0) is greater than 'E' or not;

If yes go to step (4); otherwise proceed to step (7).

7. Display the value of root as : **x0**

Instruction for report preparation:

In your initial report:

1. Title of lab
2. Objective of lab
3. Necessary Theory
4. Algorithm
5. Flowchart

In your final report:

6. Manual calculation: tabulate the result and find the root correct up to three decimal places

The table format should be:

Iterations	x1	x2	f(x1)	f(x2)	x0	f(x0)	error

7. Observations and results
8. Discussions: state following concerned with **Bisection** and **False Position** Method Choice of interval
    a. Process from initial guess to subsequent approximation
    b. Speed
    c. Computational effort
    d. Termination of Iterative cycle
    e. Pros and cons