Numerical Methods - Lab 4

**Lab Task**

The bisection method in mathematics is a root-finding method that repeatedly bisects an interval and then selects a subinterval in which a root must lie for further processing. It is a very simple and robust method, but it is also relatively slow.

* Implement the bisection method using functions.

# Take Inputs

a=input('Enter function');

f=inline(a);

xl=input('Enter lower guess:') ;

xu=input('Enter upper guess:');

tol=input('Enter tolerance(recommended 0.001):');

# Validate Inputs

while true

if f(xu)\*f(xl) <0

break;

else

fprintf('Wrong Guess! Enter new guess\n');

xl = input('Enter Lower Guess:');

xu = input('Enter Upper Guess:');

end

end

# Convergence

xr\_old = xl; % Initialize xr\_old for the first iteration

for i=2:1000

xr = (xu + xl)/2;

if f(xu)\*f(xr) < 0

xl = xr;

else

xu = xr;

end

% No need to repeat the if condition, it's done above

% Determine error

error = abs(xr - xr\_old);

if error < tol

break

end

xr\_old = xr; % Update xr\_old for the next iteration

end

fprintf('\n\n');

% print root

fprintf('The root is: %f\n', xr);

fprintf('Final error: %f', error);