Chittagong Independent University (CIU)



School of Science & Engineering (SSE)

Lab Report

Course title : Numerical Methods for Engineering

Course code : CCR250L

Lab no : 01

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Submitted to	Submitted by
Habibur Rahaman	Student Name: Muhammad Sazzad
Lecturer	Mannan
Computer Science & Engineering	ID: 16102075
School of Science & Engineering	Semester: Autumn 2022
Chittagong Independent University	Section: 01
	Department: CSE

Problem Statement / Problem description: Implementation of bisection method.

Objectives of the lab: To find the roots of nonlinear equations using Bisection method

Derivation of the method:

The bisection method is an approximation method to find the roots of the given equation by repeatedly dividing the interval. This method will divide the interval until the resulting interval is found, which is extremely small.

Algorithm:

- Start
- Read a, b,e=0.001

Here a and b are initial guesses [[[x*x-3]]]

e is the absolute error i.e. the desired degree of accuracy*

- Compute: f1 = f(a) and f2 = f(b)
- If (f1*f2) > 0, then display initial guesses are wrong and goto (11).
 Otherwise continue.
- c = (a + b)/2
- If ([(a − b)] < e), then display c and goto (11).
 - * Here [] refers to the modulus sign. *
- Else, f = f(c)
- If ((f*f1) > 0), then a = c and f1 = f.
- Else, b = c and f2 = f.
- Goto (5).

Now the loop continues with new values.

Stop

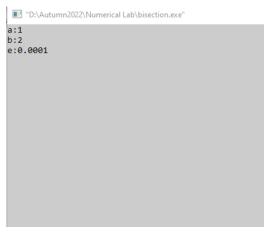
Source code:

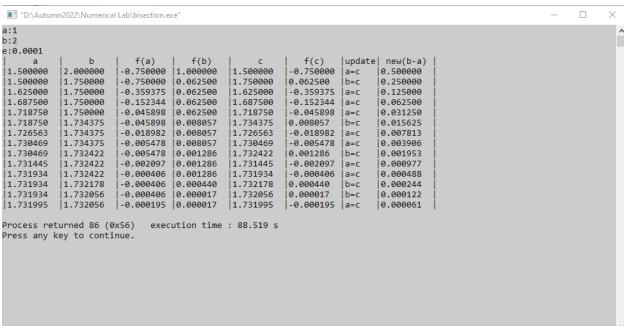
```
#include <stdio.h>
#include <stdlib.h>
#include <math.h>
float fun(float a);
char* update;
void main(){
float a,b,e,f1,f2,c,f;
printf("a:");
scanf("%f",&a);
printf("b:");
scanf("%f",&b);
printf("e:");
scanf("%f",&e);
f1=fun(a);
f2=fun(b);
if((f1*f2)>0){
printf("You guess wrong interval.");
return;
}else{
```

```
do{
c=(a+b)/2;
f=fun(c);
if(f*f1>0){
 a=c;
 update="a=c";
 f1=f;
}else{
 b=c;
 update="b=c";
 f2=f;
}
printf("|%-10f|%-10f|%-10f|%-10f|%-10f|%-6s|%-10f|\n",a,b,f1,f2,c,f,upda
te,b-a);
}while(fabs(b-a)>=e);
}
//printf("f1=%f",f1);
}
```

```
float fun(float a){
float k;
k=(a*a)-3;
return k;
}
```

Sample input/ output (Snapshot):





Application of the method:

- Scientific programing
- Modeling of airflow over airoplane bodies
- Estimation of ocean current
- Electromagnetics

Discussion:

Using bisection method we can find roots of a function. It is a very effective method.