DR. AKHILESH DAS GUPTA

INSTITUTE OF TECHNOLOGY & MANAGEMENT

(NEW DELHI)

COMPUTATIONAL METHODS LAB

PRACTICAL FILE

PAPER CODE : ES-251

SUBMITTED BY:-

NAME : Shashank Pandey

ROLL NO : 14815602721

SEMESTER : THIRD

BRANCH : CSE

SUBMITTED TO:-

DR. ANSHUL SHRIVASTAVA

ASSOSIATE PROFESSOR , ASH (MATHS)

EXPERIMENT - 1

Aim:- To find the root of equation using Newton Raphson Method

Code:-

```
#include<iostream>
#include<iomanip>
#include<cmath>
using namespace std;
float f(float x){
return x*log10(x)-1.2;
}
float df(float x){
return log10(x)+0.43429;
}
int main(){
int itr, maxitr;
float h, x0, x1, aerr;
cout<<"Enter x0, allowed error, maximum iterations"<<endl;
cin>>x0>>aerr>>maxitr;
cout<<fixed;
```

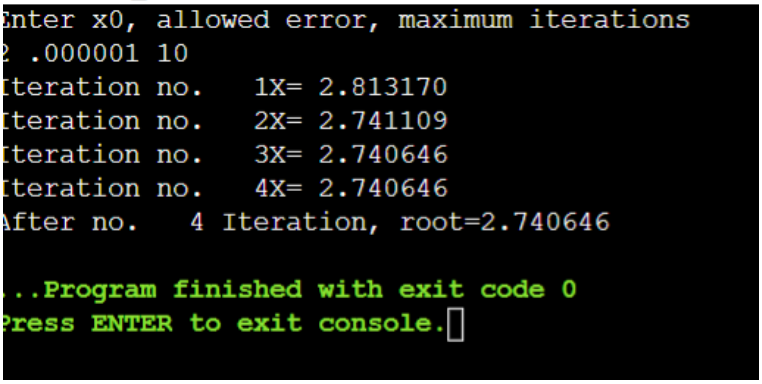
```
for(itr=1;itr<=maxitr;itr++){
h=f(x0)/df(x0);
x1=x0-h;
cout<<"Iteration no. "<<setw(3)<<itr;
cout<<"X="<<setw(9)<<setprecision(6);
cout<<x1<<endl;
if(fabs(h)<aerr){
cout<<"After no. "<<setw(3)<<itr;
cout<<" Iteration, root=";
cout<<setw(8)<<setprecision(6)<<x1;
return 0;
}
x0=x1;
}

cout<<"Iteration not sufficient, ";
cout<<"solution does not converge"<<endl;
```

return 1;

}

OUTPUT:-



EXPERIMENT - 2

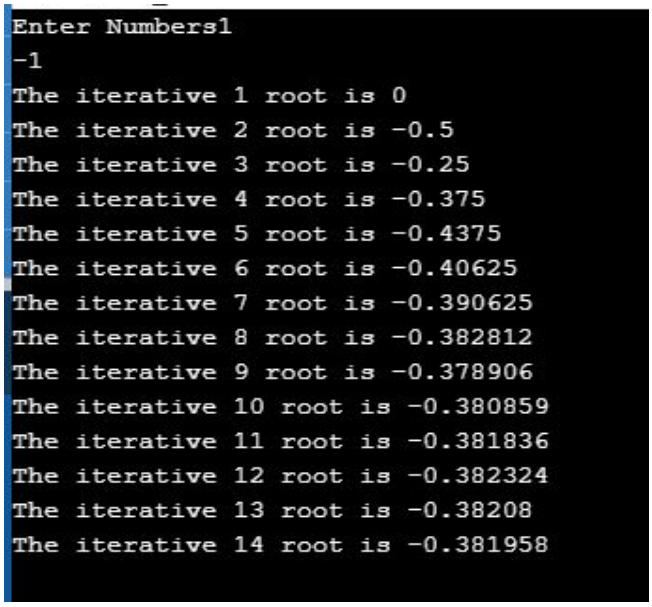
Aim:- To find the root of equation using Bisection Method

Code:-

```
#include <iostream>
#include <math.h>
using namespace std;
float fn(float x){
    return  pow(x,2)+(3*x)+1 ;
}
int main(){   float a,b,e=0,z;
   cout<<"Enter Numbers";
   cin>>a>>b;
   z=(a+b)/2;
   do{   z=(a+b)/2;
      e++;
      if ( (fn(a)* fn(b)) <= 0 ){
         if (fn(z)>0 && fn(a)>0)
            a=z;
         else if (fn(z)>0 && fn(b)>0)
            b=z;
```

```
        else if (fn(z)<0 && fn(a)<0)
            a=z;
        else if (fn(z)<0 && fn(b)<0)
            b=z;
        cout<<"The iterative "<<e<<" root is "<<z;
        cout<<endl;
      }
      else
        cout<<"Enter again";
   }
while(abs(fn(z))>0.0001);
   return 0;
}
```

OUTPUT:-


Enter Numbers1
-1
The iterative 1 root is 0
The iterative 2 root is -0.5
The iterative 3 root is -0.25
The iterative 4 root is -0.375
The iterative 5 root is -0.4375
The iterative 6 root is -0.40625
The iterative 7 root is -0.390625
The iterative 8 root is -0.382812
The iterative 9 root is -0.378906
The iterative 10 root is -0.380859
The iterative 11 root is -0.381836
The iterative 12 root is -0.382324
The iterative 13 root is -0.38208
The iterative 14 root is -0.381958

EXPERIMENT - 3

Aim:- To find the root of equation using Secant Method

Code:-

```
#include<iostream>
#include<iomanip>
#include<math.h>
#include<stdlib.h>
#define    f(x)    x*x*x - 2*x - 5
using namespace std;
int main(){
float x0, x1, x2, f0, f1, f2, e;
int step = 1, N;
cout<< setprecision(6)<< fixed;
cout<<"Enter first guess: ";
 cin>>x0;
 cout<<"Enter second guess: ";
 cin>>x1;
cout<<"Enter tolerable error: ";
cin>>e;
 cout<<"Enter maximum iteration: ";
```

```
cin>>N;
 cout<< endl<<"***************"<< endl;
 cout<<"Secant Method"<< endl;
cout<<"***************"<< endl;
do {
 f0 = f(x0);
 f1 = f(x1);
 if(f0 == f1){
  cout<<"Mathematical Error.";
 exit(0);
}
 x2 = x1 - (x1 - x0) * f1/(f1-f0);
f2 = f(x2);
  cout<<"Iteration-"<< step<<":\t x2 = "<< setw(10)<< x2<<" and f(x2) = "<<
setw(10)<< f(x2)<< endl;
  x0 = x1;
 f0 = f1;
 x1 = x2;
f1 = f2;
 step = step + 1;
 if(step > N){
```

```
cout<<"Not Convergent.";
 exit(0);
}
 }while(fabs(f2)>e);

cout<< endl<<"Root is: "<< x2;
return 0;
}
```

OUTPUT:-