

```

//Newton-Raphson Method
#include<iostream>
#include<cmath>
#include<iomanip>
using namespace std;
double f(double x);    //declare the function for the given equation
double f(double x)    //define the function here, ie give the equation
{
    double a=pow(x,3.0)-x-11.0;    //write the equation whose roots are to be
determined
    return a;
}
double fprime(double x);
double fprime(double x)
{
    double b=3*pow(x,2.0)-1.0;    //write the first derivative of the equation
    return b;
}
int main()
{
    double x,x1,e,fx,fx1;
    cout.precision(4);    //set the precision
    cout.setf(ios::fixed);
    cout<<"Enter the initial guess\n";    //take an initial guess
    cin>>x1;
    cout<<"Enter desired accuracy\n";    //take the desired accuracy
    cin>>e;
    fx=f(x);
    fx1=fprime(x);
    cout <<"x{i}"<<"    "<<"x{i+1}"<<"    "<<"|x{i+1}-x{i}|"<<endl;
    do
    {
        x=x1;    //make x equal to the last calculated value of
x1*/
        fx=f(x);    //simplifying f(x)to fx
        fx1=fprime(x);    //simplifying fprime(x) to fx1
        x1=x-(fx/fx1);    //calculate x{1} from x, fx and fx1*/
        cout<<x<<"    "<<x1<<"    "<<abs(x1-x)<<endl;
    }while (fabs(x1-x)>=e);    //if |x{i+1}-x{i}| remains greater than the
desired accuracy, continue the loop*/
    cout<<"The root of the equation is "<<x1<<endl;
    return 0;
}
//output attached as jpg

```

```

manas@manas-VirtualBox:~/NA$ g++ newton1.cc
manas@manas-VirtualBox:~/NA$ ./a.out
Enter the initial guess
2
Enter desired accuracy
.0001
x{i}      x{i+1}      |x{i+1}-x{i}|
2.0000    2.4545      0.4545
2.4545    2.3764      0.0781
2.3764    2.3737      0.0028
2.3737    2.3736      0.0000
The root of the equation is 2.3736
manas@manas-VirtualBox:~/NA$

```

Output

Explanation of the code:



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I'm a physicist specializing in computational material science with a PhD in Physics from Friedrich-Schiller University Jena, Germany. I write efficient codes for simulating light-matter interactions at atomic scales. I like to develop Physics, DFT, and Machine Learning related apps and software from time to time. Can code in most of the popular languages. I like to share my knowledge in Physics and applications using this Blog and a YouTube channel.

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