

```

//bisection 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)-x-11.0;    //write the equation whose roots are to be determined
    return a;
}
int main()
{
    cout.precision(4);    //set the precision
    cout.setf(ios::fixed);
    double a,b,c,e,fa,fb,fc;    //declare some needed variables
    a:cout<<"Enter the initial guesses:\na=";    //Enter the value of a (set a
label('a:') for later use with goto)
    cin>>a;
    cout<<"\nb=";    //Enter the value of b
    cin>>b;
    cout<<"\nEnter the degree of accuracy desired"<<endl;    //Enter the accuracy
    cin>>e;    //e stands for accuracy
    if (f(a)*f(b)>0)    //Check if a root exists between a and b
    {
        //If f(a)*f(b)>0 then the root does not exist between a and b
        cout<<"Please enter a different initial guess"<<endl;
        goto a;    //go back to 'a' ie 17 and ask for different values of a and
b
    }
    else    //else a root exists between a and b
    {
        while (fabs(a-b)>=e)    /*if the mod of a-b is greater than the accuracy
desired keep bisecting the interval*/
        {
            c=(a+b)/2.0;    //bisect the interval and find the value of c
            fa=f(a);
            fb=f(b);
            fc=f(c);
            cout<<"a="<<a<<"    "<<"b="<<b<<"    "<<"c="<<c<<"
fc="<<fc<<endl; /*print the values of a,b,c and fc after
each iteration*/
            if (fc==0)    //if f(c)=0, that means we have found the root of the
equation
            {
                cout<<"The root of the equation is "<<c;    /*print the root of the
equation and break out of the loop*/
                break;
            }

            if (fa*fc>0)    //if f(a)*f(c)>0, that means no root exist between a and c
            {

```

```

        a=c;    /*hence make a=c, ie make c the starting point of the interval and
b the          end point*/
    }
    else if (fa*fc<0)
    {
        b=c;    /*this means that a root exist between a and c therefore make c the
end          point of the interval*/
    }
}
}    //The loop ends when the difference between a and b becomes less than
the desired accuracy ie now the value stored in 'c' can be called the approximate root
of the equation
    cout<<"The root of the equation is "<<c;    //print the root
    return 0;
}
//output attached as jpg

```

```

manas@manas-VirtualBox:~/NA$ ./a.out
Enter the initial guesses:
a=1
b=3
Enter the degree of accuracy desired
.0001
a=1.0000    b=3.0000    c=2.0000    fc=-5.0000
a=2.0000    b=3.0000    c=2.5000    fc=2.1250
a=2.0000    b=2.5000    c=2.2500    fc=-1.8594
a=2.2500    b=2.5000    c=2.3750    fc=0.0215
a=2.2500    b=2.3750    c=2.3125    fc=-0.9460
a=2.3125    b=2.3750    c=2.3438    fc=-0.4691
a=2.3438    b=2.3750    c=2.3594    fc=-0.2256
a=2.3594    b=2.3750    c=2.3672    fc=-0.1025
a=2.3672    b=2.3750    c=2.3711    fc=-0.0406
a=2.3711    b=2.3750    c=2.3730    fc=-0.0096
a=2.3730    b=2.3750    c=2.3740    fc=0.0059
a=2.3730    b=2.3740    c=2.3735    fc=-0.0018
a=2.3735    b=2.3740    c=2.3738    fc=0.0021
a=2.3735    b=2.3738    c=2.3737    fc=0.0001
a=2.3735    b=2.3737    c=2.3736    fc=-0.0009
The root of the equation is 2.3736manas@manas-VirtualBox:~/NA$

```

Explanation of the above code:



Manas Sharma

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.

manas.bragitoff.com/



Share this:

[Click to share on Facebook \(Opens in new window\)](#)

[Click to share on Twitter \(Opens in new window\)](#)

[Click to share on WhatsApp \(Opens in new window\)](#)

[Click to share on Pinterest \(Opens in new window\)](#)

[Click to share on Reddit \(Opens in new window\)](#)

[Click to share on LinkedIn \(Opens in new window\)](#)

[Click to email a link to a friend \(Opens in new window\)](#)

[Click to print \(Opens in new window\)](#)

[Click to share on Tumblr \(Opens in new window\)](#)

[Click to share on Pocket \(Opens in new window\)](#)

[Click to share on Telegram \(Opens in new window\)](#)

[wpedon id="7041" align="center"]