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Section – CSE A

Assignment – 1

1. Find the Square root of any positive number correct upto 6 decimal place by using Bisection Method.

Code :

#include<bits/stdc++.h>

#define float double

#define inti long long int

using namespace std;

float bisection(float n,float l,float h)

{

if(abs((pow((l+h)/2,2)-n))<=0.0000001)

return (l+h)/2;

else if(pow((l+h)/2,2)>n)

return bisection(n,l,(l+h)/2);

else

return bisection(n,(l+h)/2,h);

}

int main()

{

float n;

cout<<"Enter a number"<<endl;

cin>>n;

float x=bisection(n,0,n/2);

cout<<"root of the number : "<<n<<" = ";

cout<<setprecision(6)<<fixed<<x;

return 0;

}

OBSERVATION :

Enter a number

5

Root of the number : 5 = 2.236068

2. Use Bisection method to find a solution of 2 − 5x^2 – e^x = 0, correct up to four decimal place in the interval [0, 1].

Code :

#include<bits/stdc++.h>

using namespace std;

#define float double

float equation(float x)

{

float sum=0;

sum=(2-(5\*x\*x)-exp(x));

return sum;

}

float root(float l,float h)

{

if(abs(equation((l+h)/2))<0.00001)

return (l+h)/2;

if(equation((l+h)/2)>0.00000)

return root((l+h)/2,h);

else

return root(l,(l+h)/2);

}

int main()

{

cout<<"root between 0 and 1 for the equation is "<<setprecision(4)<<fixed<<root(0,1)<<endl;

return 0;

}

OBSERVATION :

Root between 0 and 1 for the equation is 0.3435

3. Repeat the exercise 1 and 2 by using regula falsi method.

Code :

3(1)

#include<bits/stdc++.h>

using namespace std;

#define float double

float equation(float x)

{

return x\*x-8;

}

int main()

{

float a=0,b=8,x;

for(int i=0;i<=1000001;i++)

{

x=(a\*equation(b)-b\*equation(a))/(equation(b)-equation(a));

if(equation(a)\*equation(x)<0)

{

b=x;

}

else

a=x;

}

cout<<"root of 8 is ";

cout<<setprecision(6)<<fixed<<x;

}

OBSERVATION :

Root of 8 is 2.828427

3(2)

#include<bits/stdc++.h>

using namespace std;

#define float double

float equation(float x)

{

return (2-(5\*x\*x)-exp(x));

}

int main()

{

float a=0,b=1,x;

for(int i=0;i<=1000001;i++)

{

x=(a\*equation(b)-b\*equation(a))/(equation(b)-equation(a));

if(equation(a)\*equation(x)<0)

{

b=x;

}

else

a=x;

}

cout<<"root of equation between 0 and 1 is ";

cout<<setprecision(4)<<fixed<<x;

}

OBSERVATION :

Root of the equation between 0 and 1 is 0.3435

4. Write your observation of the following two method.

Both method worked correctly but the convergence process in the bisection method is very slow. It depends only on the choice of end points of the interval [a,b]. The function f(x) does not have any role in finding the point c (which is just  the mid-point of a and b). It is used only to decide the next smaller interval [a,c] or [c,b]. A better approximation to c can be obtained by taking the straight line L joining the points (a,f(a)) and (b,f(b)) intersecting the x-axis. To obtain the value of c we can equate the two expressions of the slope m of the line L.

We conclude that regular falsi method is better than bisection method for finding the roots of a equation.