

## RegulaFalsi.cpp

```
1  #include<iostream>
2  #include<cmath>
3  #include <iomanip>
4  #include<fstream>
5  #include <cstdlib>
6
7  using namespace std;
8
9  double f(double x)
10 {
11     return pow(x,10.0)-1;
12 }
13
14 double RegulaFalsi(double x1, double xu, double es, double max_itr)
15 {
16     ofstream outfile("RegulaFalsi1.dat"); // Open file to write output
17     outfile << "Iteration" << setw(15) << "x1" << setw(15) << "xu" << setw(15) << "xr" <<
18     setw(15) << "ea" << endl;
19
20     int itr = 0;
21     double ea = 100,xr = 0.0,xrold;
22     double fl = f(x1), fu = f(xu);
23     int iu = 0;
24     int il = 0;
25
26     while(true)
27     {
28         xrold = xr;
29         xr = xu - ((fu*(x1-xu))/(f1-fu));
30         itr = itr + 1;
31         if(xr !=0)
32         {
33             ea = fabs((xr - xrold)/(xr))*100;
34         }
35         double test = fl*f(xr);
36         if(test<0)
37         {
38             xu = xr;
39             fu = f(xu);
40             iu = 0;
41             il++;
42             if(il>=2)
43             {
44                 f1 = f1/2;
45             }
46         }
47         else if(test>0)
48         {
49             x1 = xr;
50             f1 = f(x1);
51             il = 0;
52             iu++;
53         }
54     }
55 }
```

```

52         if(iu>=2)
53         {
54             fu = fu/2;
55         }
56     }
57     else
58     {
59         ea = 0;
60     }
61     cout << itr << setw(18) << x1 << setw(18) << xu << setw(18) << xr << setw(18) << ea
<< endl;
62     outfile << itr << setw(18) << x1 << setw(18) << xu << setw(18) << xr << setw(18) <<
ea << endl;
63     if(ea <= es && max_itr)
64     {
65         break;
66     }
67 }
68 return xr;
69 }
70
71
72 int main()
73 {
74     double x1,xu,es,max_itr;
75     cout << "Enter the value of lower bound 'x1'\n";
76     cin >> x1;
77     cout << "Enter the value of lower bound 'xu'\n";
78     cin >> xu;
79     cout << "Enter the value of lower bound 'es'\n";
80     cin >> es;
81     cout << "Enter the value of maximum iterations 'max_itr'\n";
82     cin >> max_itr;
83
84     while(f(x1)*f(xu)>=0)
85     {
86         cout << "Invalid bracket! f(x1) * f(xu) must be negative.\n";
87         cout << "Re-enter lower bound (x1): ";
88         cin >> x1;
89         cout << "Re-enter upper bound (xu): ";
90         cin >> xu;
91     }
92
93     double root = RegulaFalsi(x1,xu,es,max_itr);
94     cout << "Approximate root is :" << root << endl;
95     system("python vis.py");
96
97     return 0;
98 }

```