PROGRAM -3

Aim

To Find the roots of an equation using Iteration Method.

Algorithm

1. Start

2.Read values of x0 and e.

　　　*here x0 is the initial approximation.

　　　e is the absolute error or the desired degree of accuracy, also the stopping criteria*

3.Calculate x1 = g(x0)

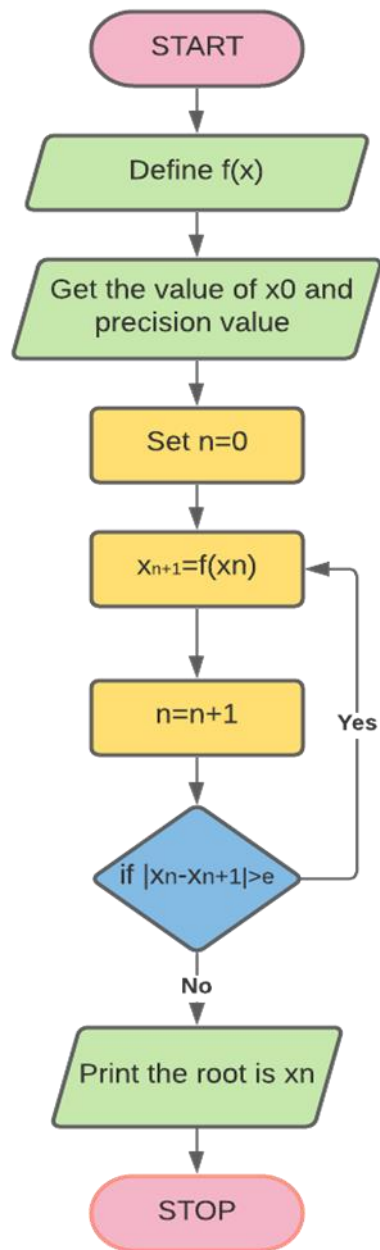4.If |x1 – x0| <= e, goto step 6.

5.Else, assign x0 = x1 and goto step 3.

6.Display xn as the root.

7.Stop.

Flowchart

Program code

```cpp
#include<bits/stdc++.h>

using namespace std;

#define f(x) exp(x)-3x // equation
#define g(x) exp(x)/3

int main()
{
```

```cpp
    float x0,x1,e=1;
    cout<< "input the initial guess:";
    cin>>x0;
    cout<<x0<<endl;
    while(e>0.0001)
    {
        x1=g(x0);//working formula
        e=fabs((x1-x0)/x1);
        x0=x1;
        cout<<x0<<endl;
    }
    cout<< "\nthe root of the equation ="<<x0;
    return 0;
}
```

```
input the initial guess:1
1
0.906094
0.824879
0.760535
0.71314
0.680129
0.658044
0.643671
0.634485
0.628684
0.625047
0.622778
0.621366
0.62049
0.619946
0.619401
0.619271
0.619191
0.619142

the root of the equation =0.619142
```

```cpp
#include<bits/stdc++.h>

using namespace std;

#define f(x) pow(x , 3) - pow(x,2)-1  // equation
#define g(x) std::cbrt(pow(x,2)+1)

int main()
{
```

```cpp
    float x0,x1,e=1;
    cout<< "input the initial guess:";
    cin>>x0;
    cout<<x0<<endl;
    while(e>0.0001)
    {
        x1=g(x0);//working formula
        e=fabs((x1-x0)/x1);
        x0=x1;
        cout<<x0<<endl;
    }
    cout<< "\nthe root of the equation ="<<x0;
    return 0;
}
```

```
input the initial guess:2
2
1.70998
1.57729
1.51653
1.48879
1.47614
1.47038
1.46776
1.46657
1.46602
1.46578
1.46566

the root of the equation =1.46566
PS C:\Users\thegr\Desktop\DU\Sem 4\Sec Lab>
```

```cpp
#include<bits/stdc++.h>

using namespace std;

#define f(x) 1/((x+1)*(x+1))  // equation
#define g(x) 1/((x+1)*(x+1))

int main()
{
    float x0,x1,e=1;
    cout<< "input the initial guess:";
```

```
    cin>>x0;
    cout<<x0<<endl;
    while(e>0.0001)
    {
        x1=g(x0);//working formula
        e=fabs((x1-x0)/x1);
        x0=x1;
        cout<<x0<<endl;
    }
    cout<< "\nthe root of the equation ="<<x0;
    return 0;
}
```

```
input the initial guess:2
2
0.111111
0.81
0.305241
0.586974
0.397064
0.512351
0.437215
0.484124
0.454004
0.473008
0.460882
0.468565
0.463675
0.466778
0.464805
0.466058
0.465262
0.465768
0.465446
0.465651
0.465521
0.465603
0.465551
0.465584

the root of the equation =0.465584
PS C:\Users\thegr\Desktop\DU\Sem 4\Sec Lab>
```