Newton’s method in C

Code:

```
/*Program: Finding real roots of nonlinear
   equation using Newton Raphson Method
*/
#include <stdio.h>
#include <conio.h>
#include <math.h>
#include <stdlib.h>

/*Defining equation to be solved.
   Change this equation to solve another problem. */
#define f(x) 3 *x - cos(x) - 1

/*Defining derivative of g(x).
   As you change f(x), change this function also. */
#define g(x) 3 + sin(x)

void main()
{
        float x0, x1, f0, f1, g0, e;
        int step = 1, N;
        system("cls");
        /*Inputs */
        printf("\nEnter initial guess:\n");
        scanf("%f", &x0);
        printf("Enter tolerable error:\n");
        scanf("%f", &e);
        printf("Enter maximum iteration:\n");
        scanf("%d", &N);
        /*Implementing Newton Raphson Method */
        printf("\nStep\t\tx0\t\tf(x0)\t\tx1\t\tf(x1)\n");
        do {
                g0 = g(x0);
                f0 = f(x0);
                if (g0 == 0.0)
                {
                        printf("Mathematical Error.");
                        exit(0);
                }

                x1 = x0 - f0 / g0;

                printf("%d\t\t%f\t%f\t%f\t%f\n", step, x0, f0, x1, f1);
                x0 = x1;

                step = step + 1;

                if (step > N)
```

```
                {
                        printf("Not Convergent.");
                        exit(0);
                }

                f1 = f(x1);

        } while (fabs(f1) > e);

        printf("\nRoot is: %f", x1);
        getch();
}
```

Output:

```
Enter initial guess:
0
Enter tolerable error:
0.01
Enter maximum iteration:
30

Step            x0              f(x0)           x1              f(x1)
1               0.000000        -2.000000       0.666667        0.000000
2               0.666667        0.214113        0.607493        0.214113

Root is: 0.607493
```