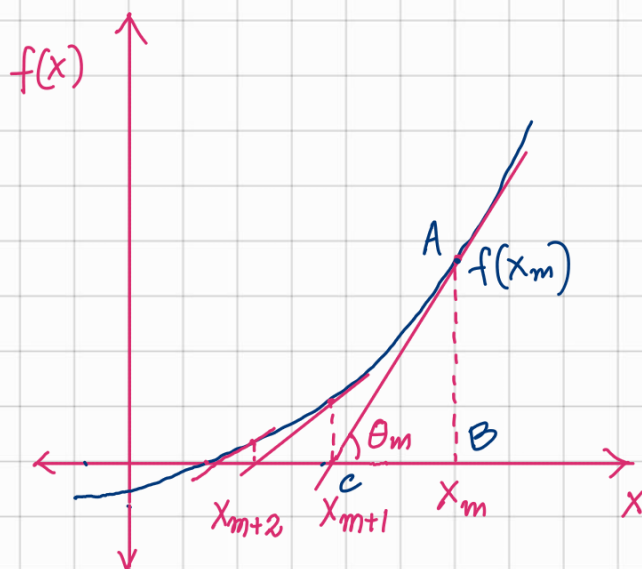


Aim : To solve the quadratic equation $x^2 + 2x - 8 = 0$ using Newton-Raphson method.

Theory :



We consider an initial guess x_m for solution to the equation $f(x) = 0$.

$$\text{Here, } f(x) = x^2 + 2x - 8$$

We draw a tangent to the curve $f(x)$ at $x = x_m$. The tangent is given by $f'(x)$.

$$\text{Here, } f'(x) = 2x + 2$$

The tangent cuts the x -axis at x_{m+1}

$$\text{We know } f'(x_m) = \tan \theta$$

$$\Rightarrow f'(x_m) = \frac{AB}{BC}$$

$$\Rightarrow f'(x_m) = \frac{f(x_m)}{x_m - x_{m+1}}$$

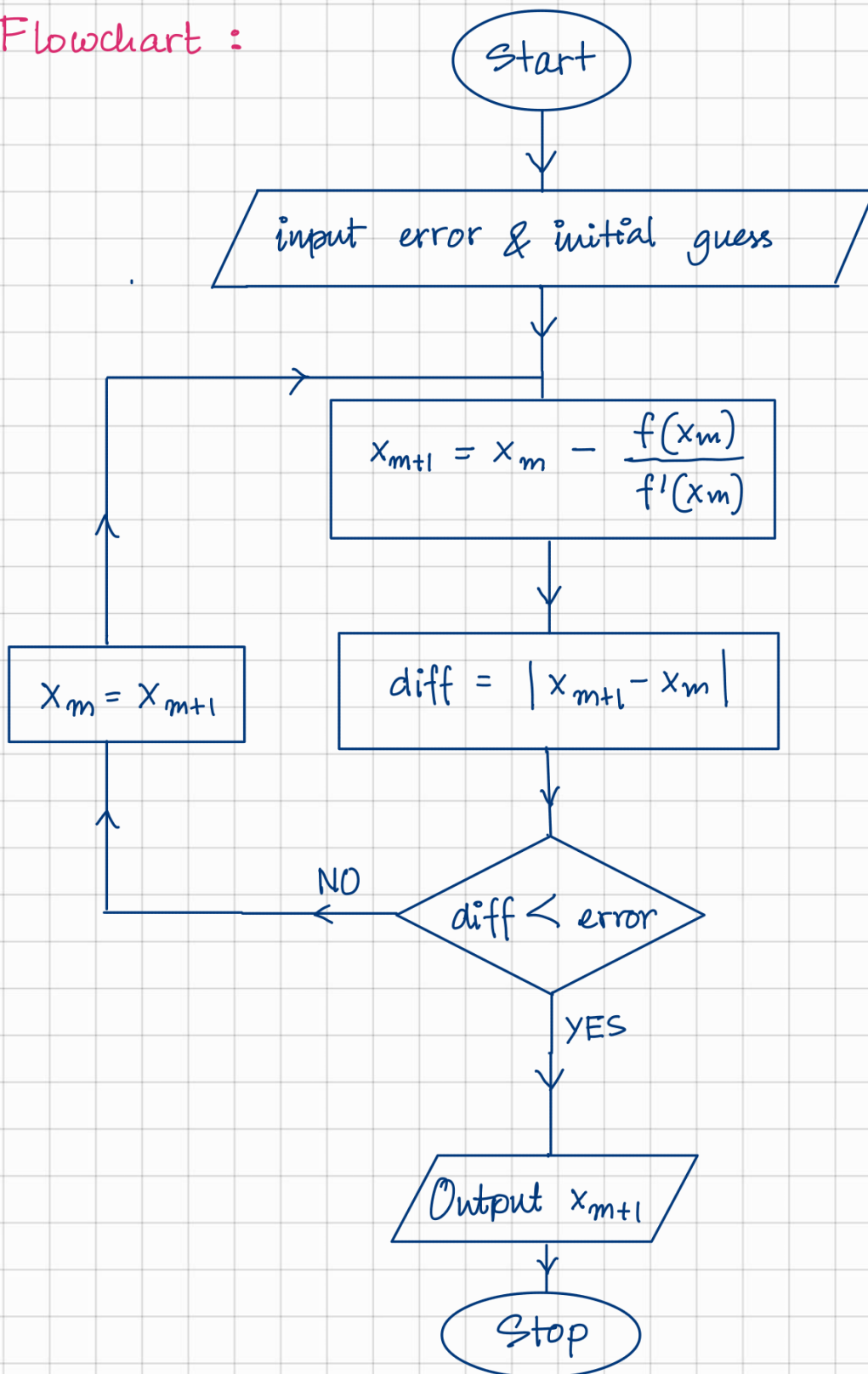
$$\Rightarrow x_m - x_{m+1} = \frac{f(x_m)}{f'(x_m)}$$

$$\Rightarrow x_{m+1} = x_m - \frac{f(x_m)}{f'(x_m)}$$

Next we repeat the same process at x_{m+1} and continue iteratively till

$$|x_{m+1} - x_m| \leq E_a \text{ (absolute error)}$$

Flowchart :



```
#include<stdio.h>
#include<math.h>

float eqn(float x)
{
    float f;
    f = x*x + 2*x - 8;
    return(f);
}

float tangent(float x)
{
    float t;
    t = 2*x + 2;
    return(t);
}

int main()
{
    float xm,xm_plus_1, error, diff;
    printf("Enter Initial Guess Solution: \n");
    scanf("%f",&xm);

    printf("Enter error limit for termination: \n");
    scanf("%f",&error);

    int i=1;

    while (i==1)
    {
        xm_plus_1 = xm - ((eqn(xm))/(tangent(xm)));
        diff = fabs(xm_plus_1 - xm);
        if(diff<error)
        {
            i++;
        }
        xm = xm_plus_1;
    }

    printf("The solution is : %f",xm_plus_1);
    return 0;
}
```

Observation : error limit =

Initial Guess	Solution

Result : The roots of the equation x^2+2x-8 are-