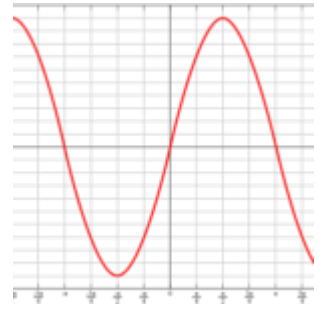


In the [last post](#) I discussed, how to evaluate a Sine series for a given value of x upto a certain number of terms.

In this post, I will show you how to modify that program to evaluate the sine series upto desired accuracy.



To do that, instead of running the loop upto n , (to evaluate and sum the n terms) we would use a do-while loop which will run until the desired accuracy is reached.

That is till, the ratio:

accuracy = $\left| \frac{t_i}{sum} \right|$ becomes less or equal to the desired accuracy.

This will be our terminating condition for the do-while loop.

Therefore, the C program to find the $\sin(x)$, correct upto a given accuracy, can be written as shown below.

PROGRAM:

```

/*****
*****INFINITE SERIES SUM*****
Series:  $\sin(x) = x - (x^3/3!) + (x^5/5!) + \dots$ 
*****/
#include<stdio.h>
#include<math.h>
main(){
    int i=1;
    double x,t0,t1,R,sum,eps;
    printf("Enter the value of x:\n");
    scanf("%lf",&x);
    printf("Enter the desired accuracy: ");
    scanf("%lf",&eps);
    //Initialize First Term
    t0=x;
    //Make sum equal to the first term
    sum=t0;
    do{
        //Find the ratio of the second term to the first term using already
known relation
        R=-(x*x)/(2*i+1)/(2*i);
        //Calculate the second term
        t1=R*t0;
        //find the new sum
        sum=sum+t1;
        t0=t1;
        i++;
        //keep on summing terms until the required accuracy is reached
    }while(fabs(t1/sum)>eps);
    printf("\nThe sum is: %f with %d terms",sum,i);
}

```

OUTPUT:

```

Enter the value of x:
1.57
Enter the desired accuracy: 0.00001
The sum is: 1.000000 with 6 terms

```

```

Enter the value of x:
6.28
Enter the desired accuracy: 0.000001
The sum is: -0.003185 with 16 terms

```



Manas Sharma

I'm a physicist specializing in computational material science with a PhD in Physics from Friedrich-Schiller University Jena, Germany. I write efficient codes for simulating light-matter interactions at atomic scales. I like to develop Physics, DFT, and Machine Learning related apps and software from time to time. Can code in most of the popular languages. I like to share my knowledge in Physics and applications using this Blog and a YouTube channel.

manas.bragitoff.com/



Share this:

[Click to share on Facebook \(Opens in new window\)](#)

[Click to share on Twitter \(Opens in new window\)](#)

[Click to share on WhatsApp \(Opens in new window\)](#)

[Click to share on Pinterest \(Opens in new window\)](#)

[Click to share on Reddit \(Opens in new window\)](#)

[Click to share on LinkedIn \(Opens in new window\)](#)

[Click to email a link to a friend \(Opens in new window\)](#)

[Click to print \(Opens in new window\)](#)

[Click to share on Tumblr \(Opens in new window\)](#)

[Click to share on Pocket \(Opens in new window\)](#)

[Click to share on Telegram \(Opens in new window\)](#)

[wpedon id="7041" align="center"]