

The following Taylor series expansion gives an approximation of the atan() function, for $|x| < 1$:

$$\arctan x = \sum_{n=0}^{\infty} \frac{(-1)^n}{2n+1} x^{2n+1} = x - \frac{x^3}{3} + \frac{x^5}{5} - \dots$$

Write a complete C code that asks the user to enter x and the number n of terms used in the expansion. The code should run only once, and works only for $|x| < 1$. **Note** that the angle x is given in radians; you need to convert it in degrees. Also your code should not use any function from the math.h library.

Sample Program Run:

```
Enter x (-1<x<1): -.25
Enter n: 20
atan(-0.25) = -14.3 degrees
```

```
Enter x (-1<x<1): 2.5
Done !
```

```
#include <stdio.h>
#include <math.h>
#define PI 3.14159265359
int main(void){
    double x, sum, term;
    int i, n;
    printf("Enter x (-1<x<1): ");
    scanf("%lf", &x);
    if ((x > -1.0) && (x < +1.0)){ // if (fabs(x)<1.0)
        printf("Enter n: ");
        scanf("%d", &n);
        i = 3;
        sum = term = x;

        while(i <= 2*n){
            term = -x*x*term/i;
            sum = sum + term;
            i = i+2;
        }
        sum = x*180.0/PI; //convert to degrees
        printf("atan(%.4f) = %.1f degrees\n", x, sum);
    }
    else{
        printf("Done !");
    }
}
```