K. J. Somaiya School of Engineering, Mumbai-77
(Somaiya Vidyavihar University)
Department of Science and Humanities

Course Name:	**Btech Comps**	**Semester:**	**2**
Date of Performance:	**29/01/2025**	**DIV/ Batch No:**	**c2-2**
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Experiment No: 3

Title: Write a program in C to demonstrate use of looping control structures

Aim and Objective of the Experiment:

Write a menu-driven program for the following option

a. To find whether a number is palindrome or not. (e.g. 1221 is palindrome) using while loop

b. To calculate the sum of the Fibonacci series up to ‘n’ terms(use do-while loop only)

c. Write a program in C to make such a pattern as a right angle triangle with a number that will repeat a number in a row.

COs to be achieved:

CO: Apply basic concepts of C programming for problem-solving.(CO1 and CO2).

Theory:

Loops in programming are used to repeat a block of code until the specified condition is met. A loop statement allows programmers to execute a statement or group of statements multiple times without repetition of code.

There are mainly two types of loops in C Programming:

- Entry Controlled loops: In Entry controlled loops the test condition is checked before entering the main body of the loop. **For Loop and While Loop is Entry-controlled loops**.
- Exit Controlled loops: In Exit controlled loops the test condition is evaluated at the end of the loop body. The loop body will execute at least once, irrespective of whether the condition is true or false. **do-while Loop is Exit Controlled loop**.

for Loop

for loop in C programming is a repetition control structure that allows programmers to write a loop that will be executed a specific number of times. for loop enables programmers to perform n number of steps together in a single line.

Syntax:

```
for (initialize expression; test expression; update expression)
```

```
          {
             //
             // body of for loop
             //
          }
```

For Example:-

```
for(int i = 0; i < n; ++i)
{
   printf("Body of for loop which will execute till n");
}
```

While Loop

While loop does not depend upon the number of iterations. In the for loop the number of iterations was previously known to us but in the While loop, the execution is terminated on the basis of the test condition. If the test condition will become false then it will break from the while loop else body will be executed.

```
while (test_expression)
{
   // body of the while loop

   update_expression;
}
```

do-while Loop

The do-while loop is similar to a while loop but the only difference lies in the do-while loop test condition which is tested at the end of the body. In the do-while loop, the loop body will execute at least once irrespective of the test condition.

```
do
{
   // body of do-while loop

   update_expression;

} while (test_expression);
```

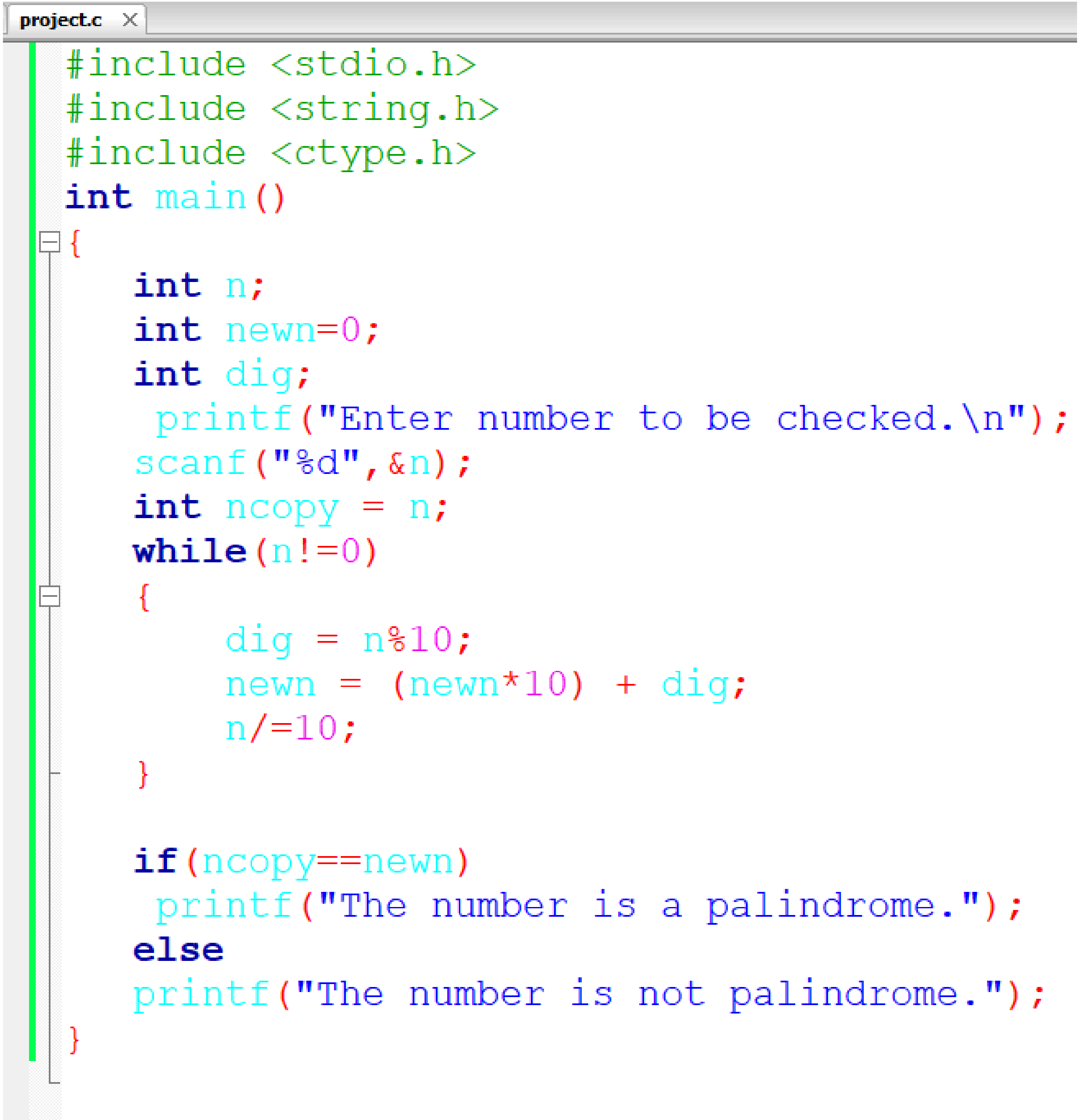
Problem Statements:

1. To find whether a number is palindrome or not. (e.g. 1221 is palindrome) using while loop
2. To calculate the sum of the Fibonacci series up to ‘n’ terms(use do-while loop only)
3. Write a program in C to make such a pattern like a right angle triangle with a number which will repeat a number in a row or as pattern given below

```
                *
           *    *   *

      *   *     *   *    *
*     *   *     *   *    *    *
```

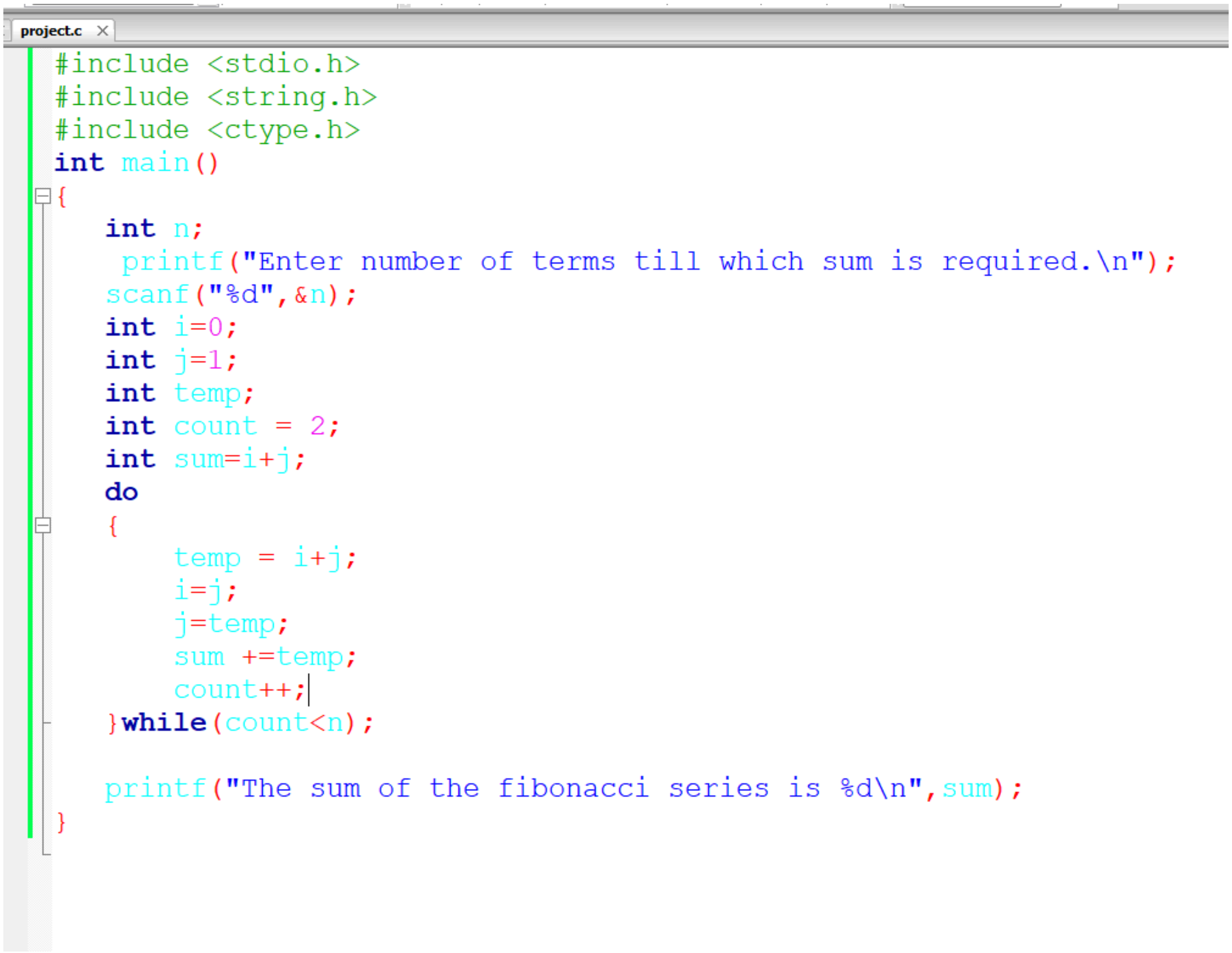
Code :

1.



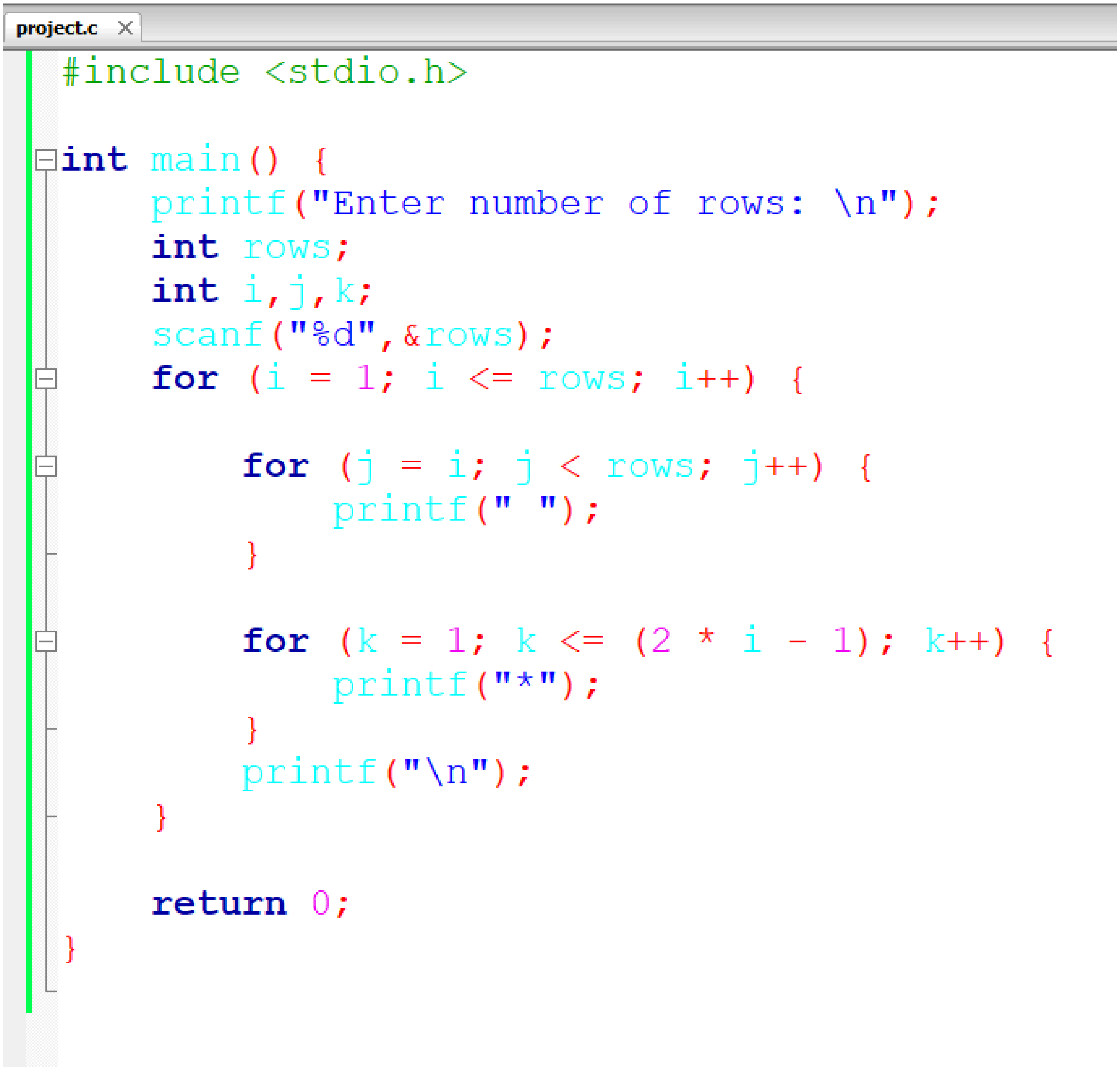
```c
#include <stdio.h>
#include <string.h>
#include <ctype.h>
int main()
{
   int n;
   int newn=0;
   int dig;
    printf("Enter number to be checked.\n");
   scanf("%d",&n);
   int ncopy = n;
   while(n!=0)
   {
       dig = n%10;
       newn = (newn*10) + dig;
       n/=10;
   }

   if(ncopy==newn)
    printf("The number is a palindrome.");
   else
   printf("The number is not palindrome.");
}
```

2.



```c
#include <stdio.h>
#include <string.h>
#include <ctype.h>
int main()
{
    int n;
     printf("Enter number of terms till which sum is required.\n");
    scanf("%d",&n);
    int i=0;
    int j=1;
    int temp;
    int count = 2;
    int sum=i+j;
    do
    {
        temp = i+j;
        i=j;
        j=temp;
        sum +=temp;
        count++;
    }while(count<n);

    printf("The sum of the fibonacci series is %d\n",sum);
}
```

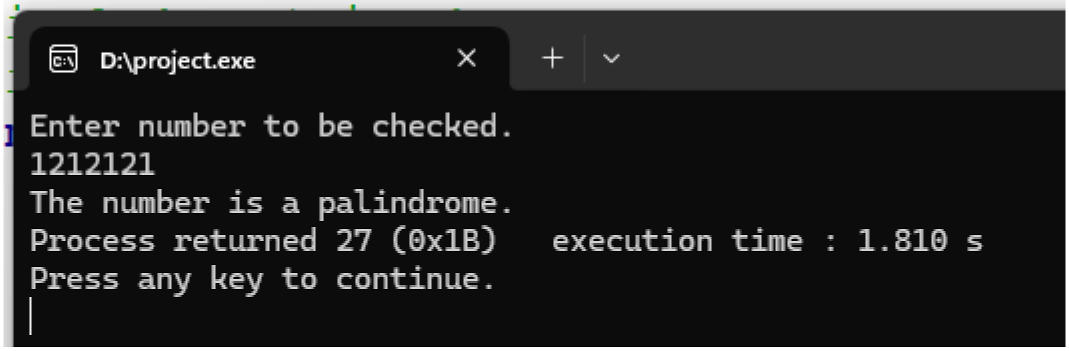
3.



project.c

```c
#include <stdio.h>

int main() {
    printf("Enter number of rows: \n");
    int rows;
    int i,j,k;
    scanf("%d",&rows);
    for (i = 1; i <= rows; i++) {

        for (j = i; j < rows; j++) {
            printf(" ");
        }

        for (k = 1; k <= (2 * i - 1); k++) {
            printf("*");
        }
        printf("\n");
    }

    return 0;
}
```

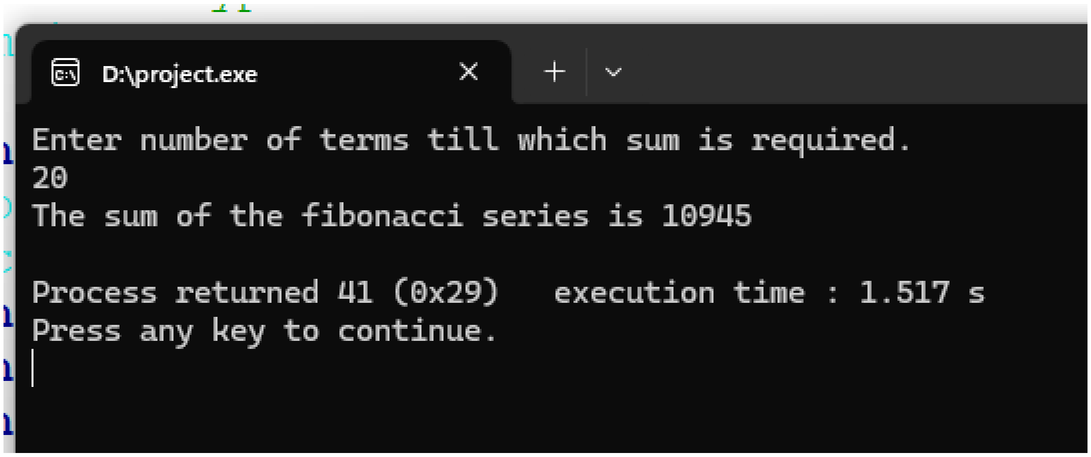
Output:



```
Enter number to be checked.
1212121
The number is a palindrome.
Process returned 27 (0x1B)   execution time : 1.810 s
Press any key to continue.
```

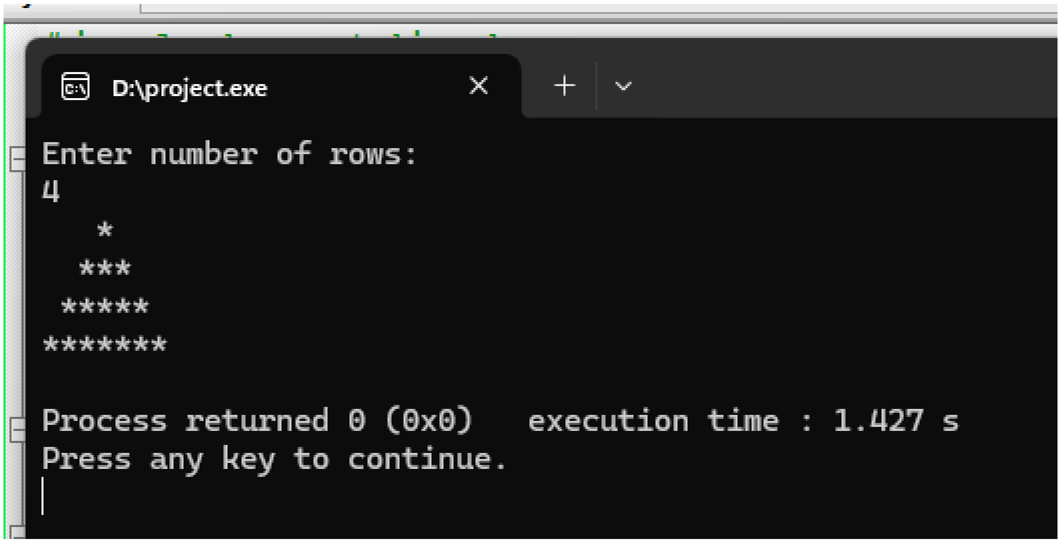
1.

2.



```
Enter number of terms till which sum is required.
20
The sum of the fibonacci series is 10945

Process returned 41 (0x29)   execution time : 1.517 s
Press any key to continue.
```

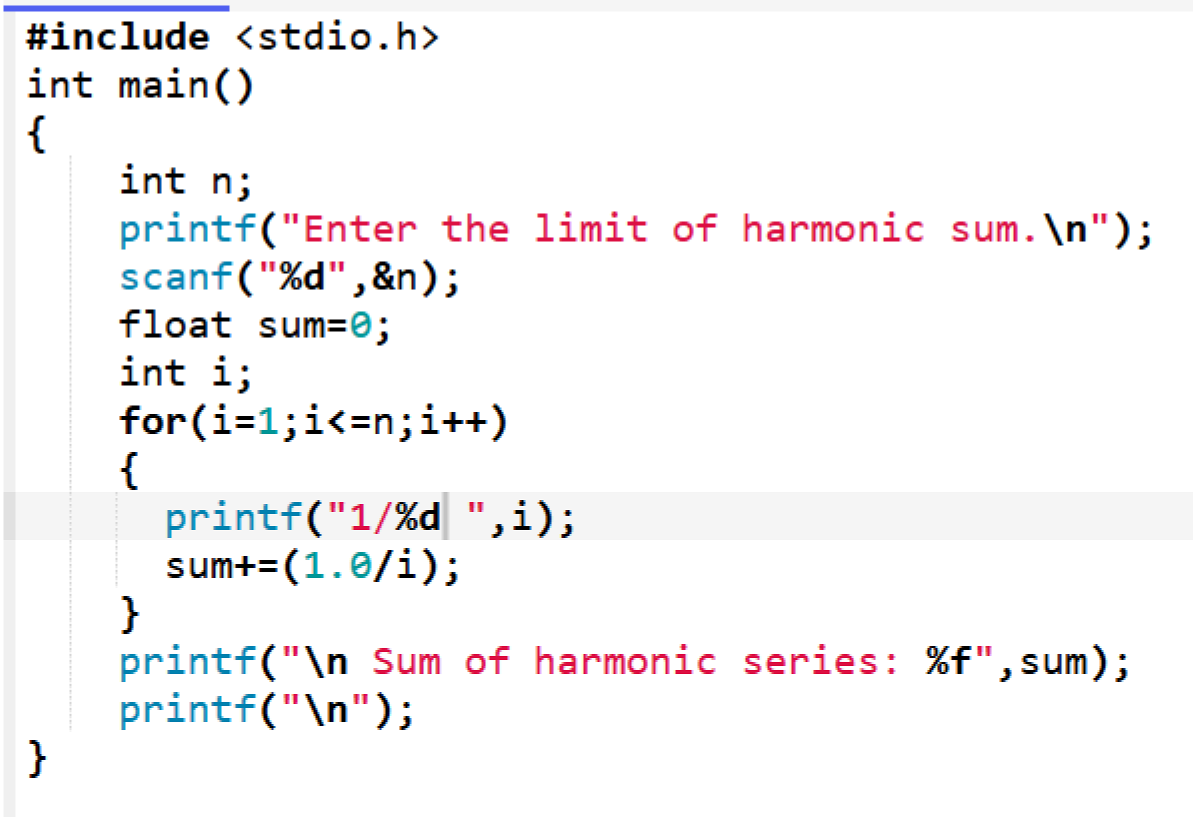
3



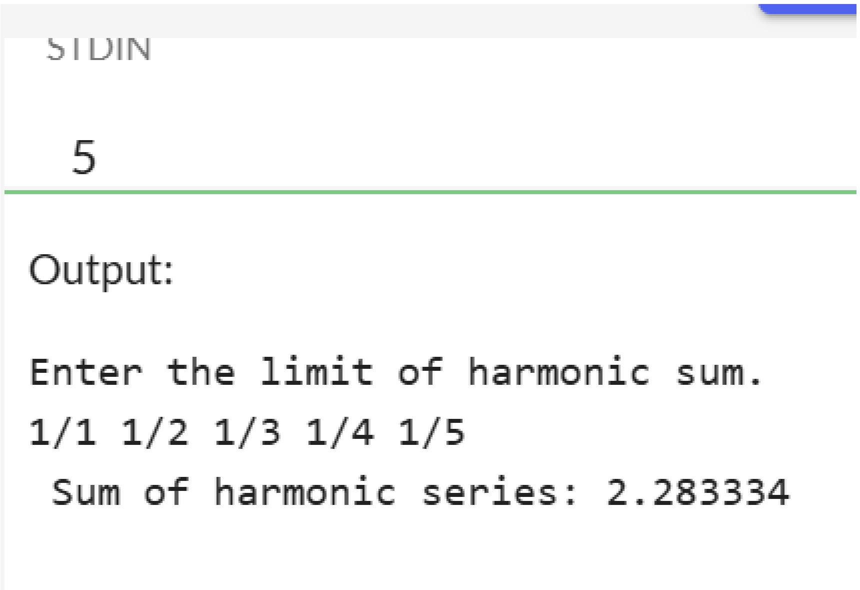
```
Enter number of rows:
4
   *
  ***
 *****
*******

Process returned 0 (0x0)   execution time : 1.427 s
Press any key to continue.
```

Post Lab Subjective/Objective type Questions:

1. Write a program in C to display the n terms of a harmonic series and their sum.
1 + 1/2 + 1/3 + 1/4 + 1/5 ... 1/n terms



```c
#include <stdio.h>
int main()
{
    int n;
    printf("Enter the limit of harmonic sum.\n");
    scanf("%d",&n);
    float sum=0;
    int i;
    for(i=1;i<=n;i++)
    {
      printf("1/%d ",i);
      sum+=(1.0/i);
    }
    printf("\n Sum of harmonic series: %f",sum);
    printf("\n");
}
```



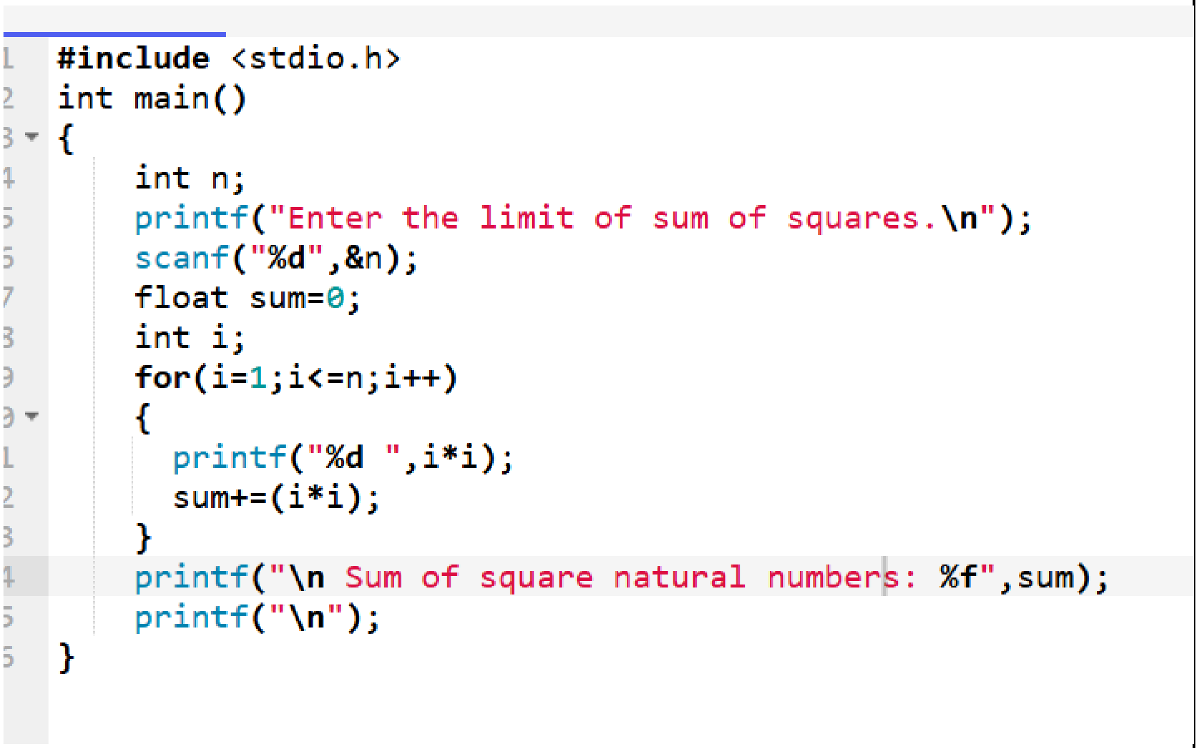
```
STDIN

  5
```

Output:

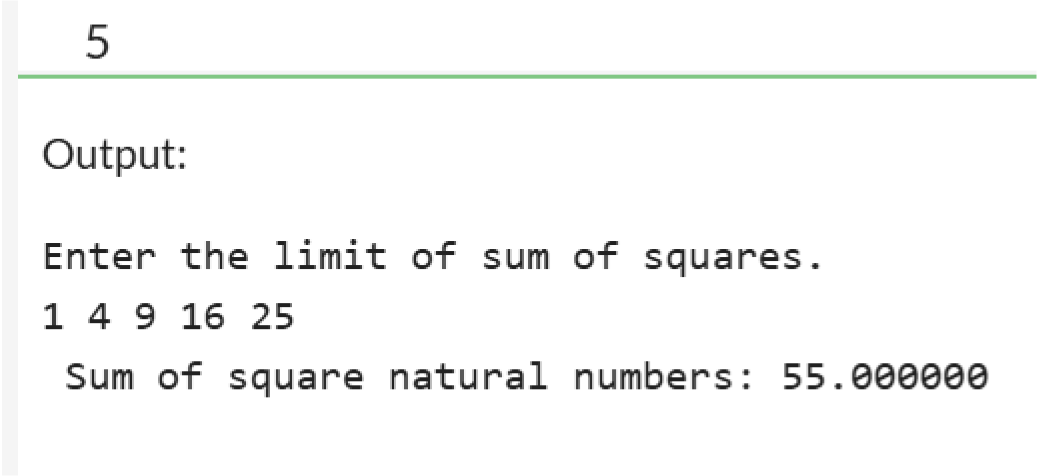
```
Enter the limit of harmonic sum.
1/1 1/2 1/3 1/4 1/5
 Sum of harmonic series: 2.283334
```

NOTE: My personal computer does not support codeblocks, hence I have used another online compiler.

2. Write a C program that displays the n terms of square natural numbers and their sum.
1 4 9 16 … n Terms



```c
#include <stdio.h>
int main()
{
    int n;
    printf("Enter the limit of sum of squares.\n");
    scanf("%d",&n);
    float sum=0;
    int i;
    for(i=1;i<=n;i++)
    {
      printf("%d ",i*i);
      sum+=(i*i);
    }
    printf("\n Sum of square natural numbers: %f",sum);
    printf("\n");
}
```



```
5

Output:

Enter the limit of sum of squares.
1 4 9 16 25
 Sum of square natural numbers: 55.000000
```

Conclusion:

Learnt the various applications of standard input and output and their implementation via loops including for and while loops. Learnt the implementation of nested for loops and do while loops.

Signature of faculty in-charge with Date: