JUNE 24 , 2021

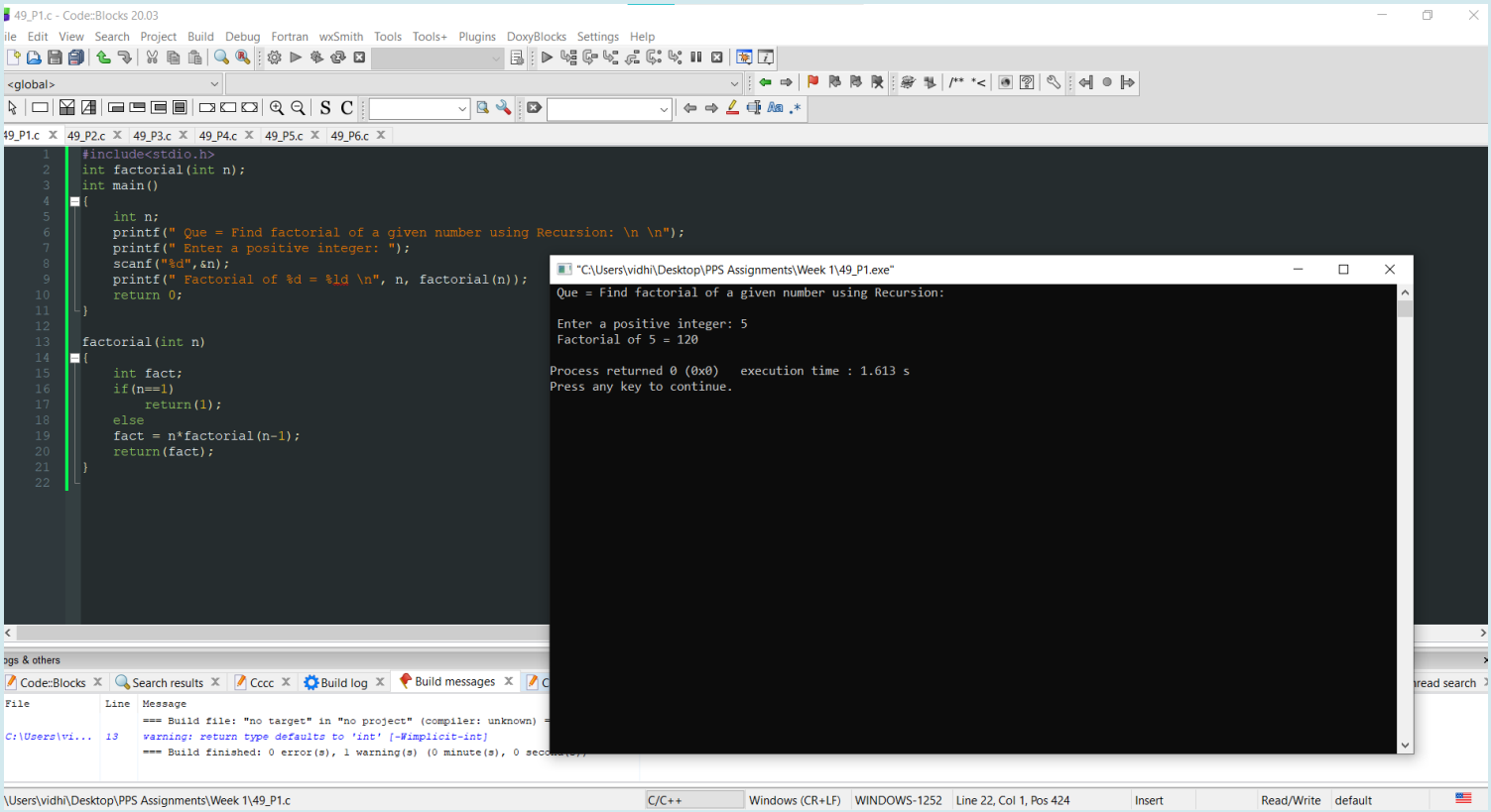
PPS-ASSIGNMENT

WEEK 1

Prepared BY :
49_D1_CSE- Vidhi Bhatt

QUE-1
WRITE A PROGRAM IN C TO FIND THE FACTORIAL OF A NUMBER USING RECURSION. EXPLAIN YOUR IMPLEMENTATION IN DETAIL.

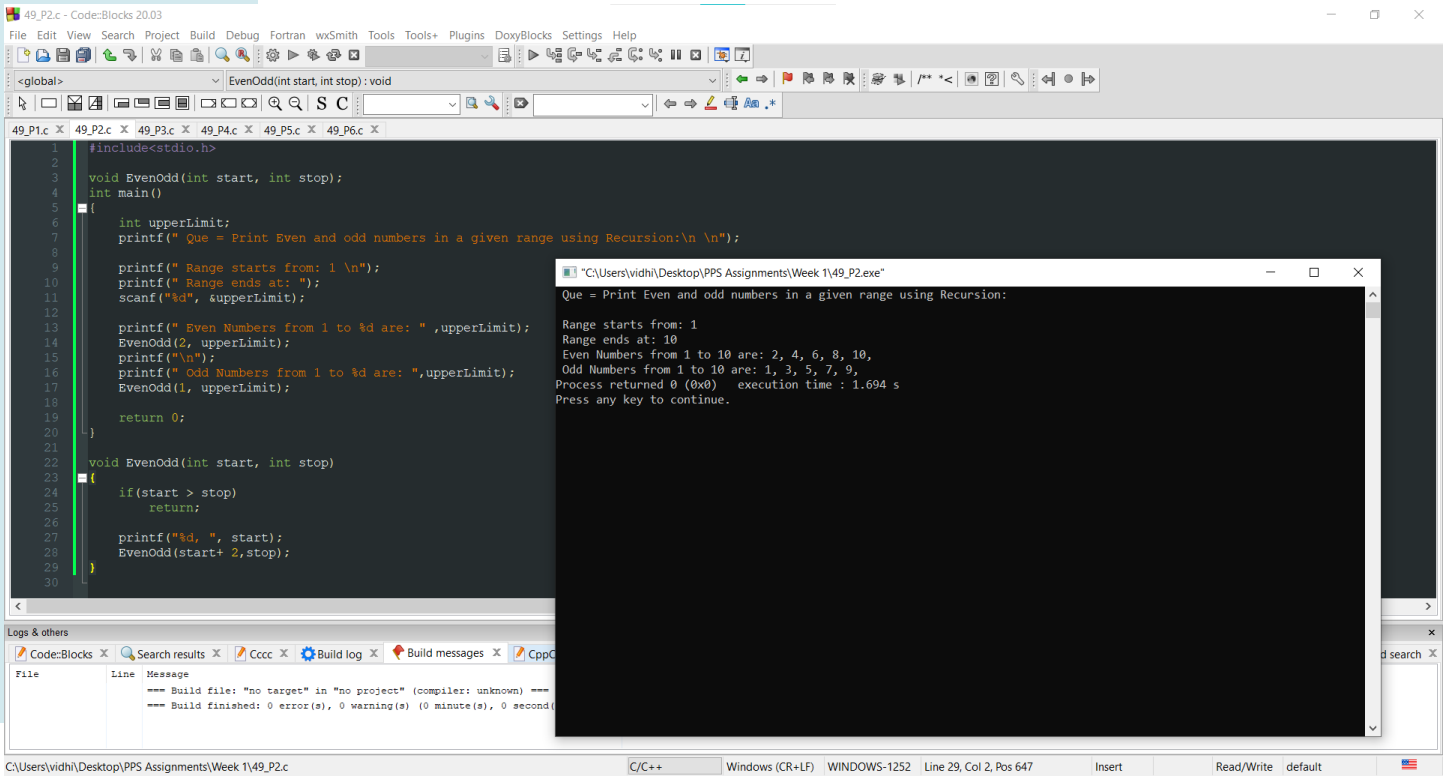
Recursion is a process in which a function calls itself. Here, first we have included the header file then we have declared a function named factorial with data type int.The actual implementation of the program starts from main.Next we define a variable n, and then we ask the user of enter a positive integer whose factorial is to be found.This value is stored at the address of n.In the next statement the control goes to the factorial function which we have defined below.Basically, factorial of a number n is the product of all positive integers less than or equal to n. Here the factorial of entered no. is calculated and the result is then passed to print statement which displays the final answer.If n=1, 1 is returned as output. If n!=1, the no. goes through the else part till the value of n becomes 1.



QUE-2

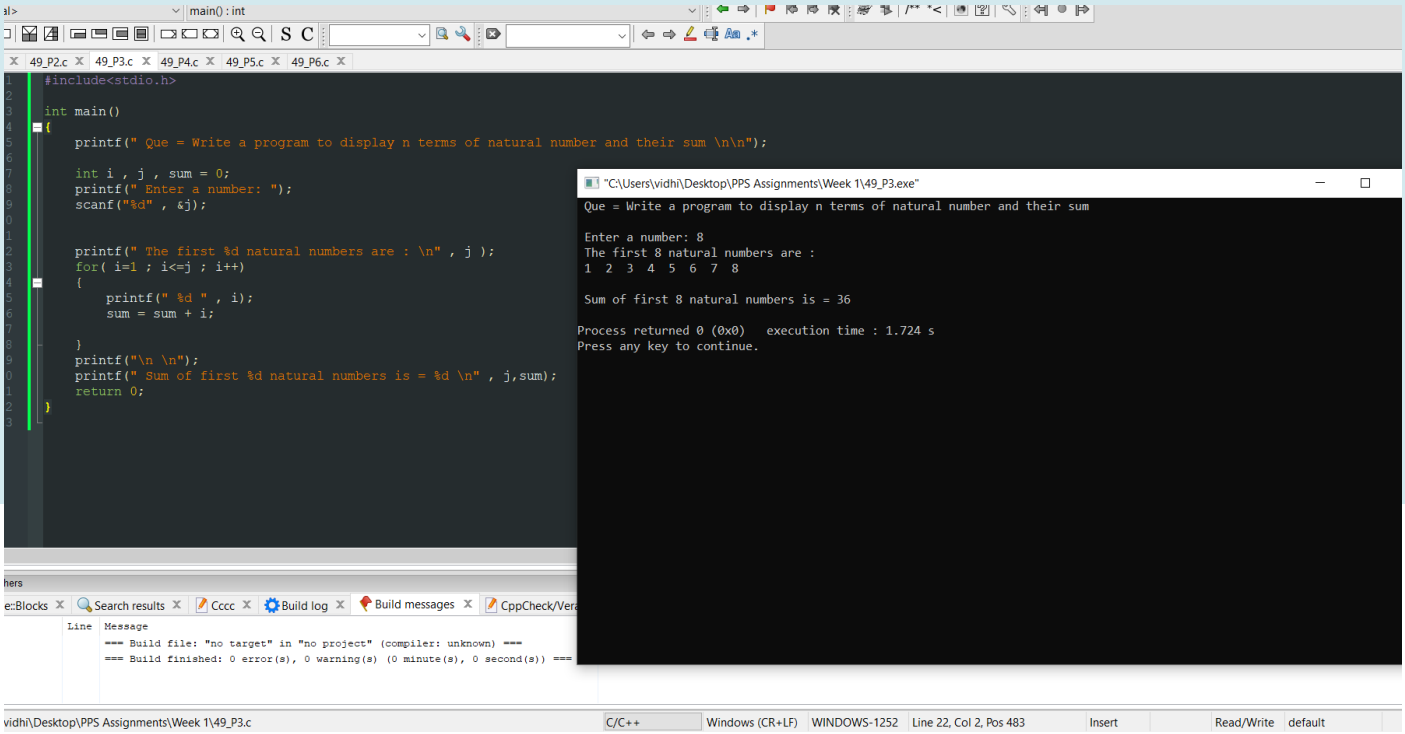
WRITE A PROGRAM IN C TO PRINT EVEN OR ODD NUMBERS IN GIVEN RANGE USING RECURSION. EXPLAIN YOUR IMPLEMENTATION IN DETAIL.

First we declare a function named EvenOdd with two arguments start and stop.Then in the main we introduce a variable named upperLimit. Now we print the que, then print that the range starts from 1. Then we ask the user to enter a number, this value is stored in variabe upperLimit. Suppose that user entered 10.This means our range is 1 to 10.Next we print Even nos. in the range.The control is shifted to the function defined below.Here we have EvenOdd(2,10).As 2>10 is false, 2 is printed and the value of start is incremented by 2.Now we have EvenOdd(4,10).This process goes on till value of start becomes greater than 10.For the next print statement we have EvenOdd(1,10).As 1>10 is false, 1 is printed and the value of start is incremented by 2.Now we have EvenOdd(3,10).This process goes on till value of start becomes greater than 10 and hence the desired output is obtained.It is to be noted that odd nos are of form 2n+1 and even nos are of 2n form.When the range starts from one , the first odd and even number is 1 and 2 respectively.Hence the functions EvenOdd(1,upperLimit) and EvenOdd(2,upperLimit) are used.



QUE - 3

WRITE A PROGRAM IN C TO DISPLAY N TERMS OF NATURAL NUMBER AND THEIR SUM. EXPLAIN YOUR IMPLEMENTATION IN DETAIL.



First three variables i, j and sum are taken.The value of sum is initialized as 0.Next we ask the user to enter a number, we store the entered value in j.Suppose that the user entered 8.We therefore print the first 8 natural numbers.We need to display the first n natural nos and the sum of these natural numbers.

To do so we take the help of a for loop.Here i=1,j=8 as i<j we print i a,ie.1 and add the value of i to sum.The value of i is now incremented by 1.This for loop goes on till i becomes = to j.After this happens we jump out of the loop and print the value of sum.And hence the desired output is obtained.

QUE - 4 04

WRITE A PROGRAM IN C TO MAKE SUCH A PATTERN LIKE A PYRAMID WITH NUMBERS INCREASED BY 1. EXPLAIN YOUR IMPLEMENTATION IN DETAIL

```
   1
  2 3
 4 5 6
7 8 9 10
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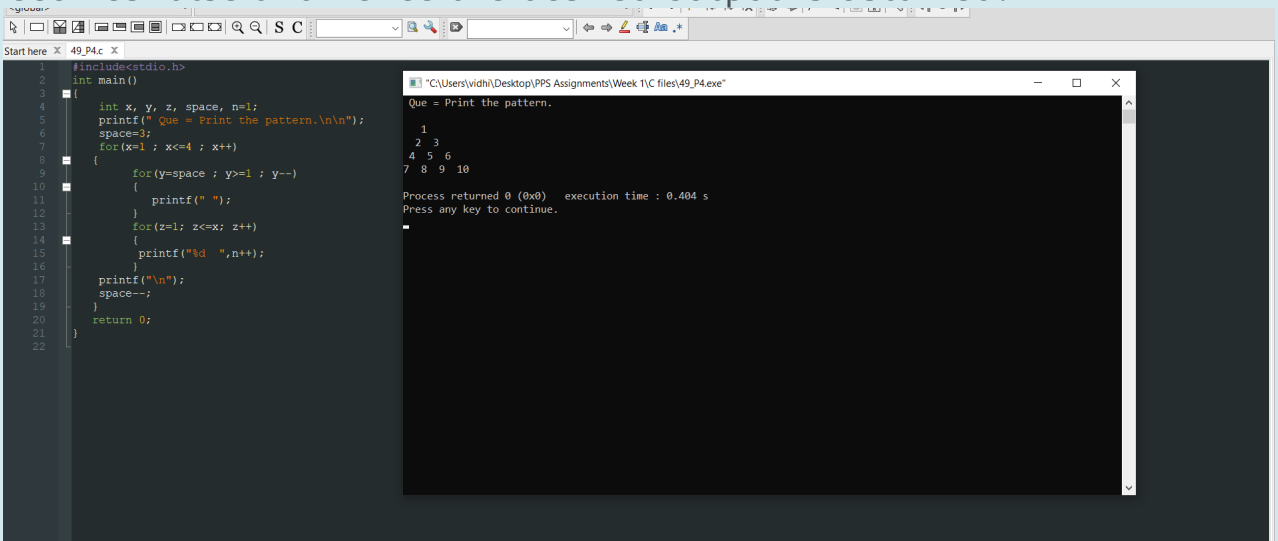
To print any program with patterns we must ask ourselves three questions. How many lines do we need to print? How many characters? What to print? To get the desired output here we use a for loop. Here we take 5 variables: x,y,z, space and num.If we observe there are 3 spaces before 1 hence space is initialized as 3.Here x denotes rows.We now enter the for loop.As x=1,1<4, we move to the inner loop.Here y=3 as y>=1 is true, a space is printed and the value of y in decremented by 1.Again y=2,y>=1 is true the loop is executed again this goes on till y>=1 becomes false.Then we enter the next for loop.As the condition is true n is printed and then n is increased by 1.Now the condition becomes false as 2<=1 is not true we jump out of the loop, go to next line and value of space is decreased by 1.Now space becomes=2 and the above procedure repeats till the condition of first for loop becomes false and hence the desired output is obtained!

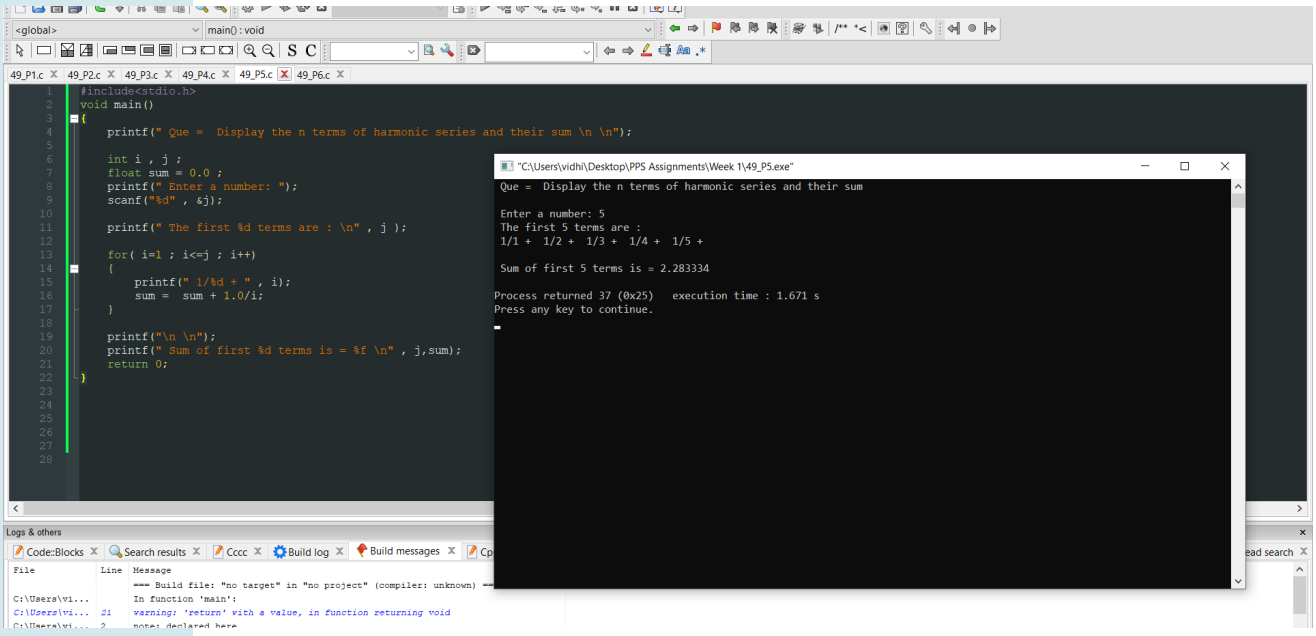


QUE - 5

WRITE A PROGRAM IN C TO DISPLAY THE N TERMS OF HARMONIC SERIES AND THEIR SUM. 1 + 1/2 + 1/3 + 1/4 + 1/5 ... 1/N TERMS. EXPLAIN YOUR IMPLEMENTATION IN DETAIL.

Two variables i and j are taken with datatype int and one variable sum is taken with datatype float. We ask the user to enter a number and we store it in j.Let the number entered by the user be 5. As per the question we need to display the first 5 terms and their sum in harmonic series for this eg. To do so we take the help of a for loop.

In for loop, i=1,j=5, as i<j we print i and add value of i in sum. Now the value of i is incremented by 1.Which means that now i=2 and we enter the loop again.This goes on till i=5 after which we jump out of the loop and print the value of sum.It is to be noted that as per the formula of harmonic series the sum maynot be a perfect integer value always hence we have used the datatype float for sum.

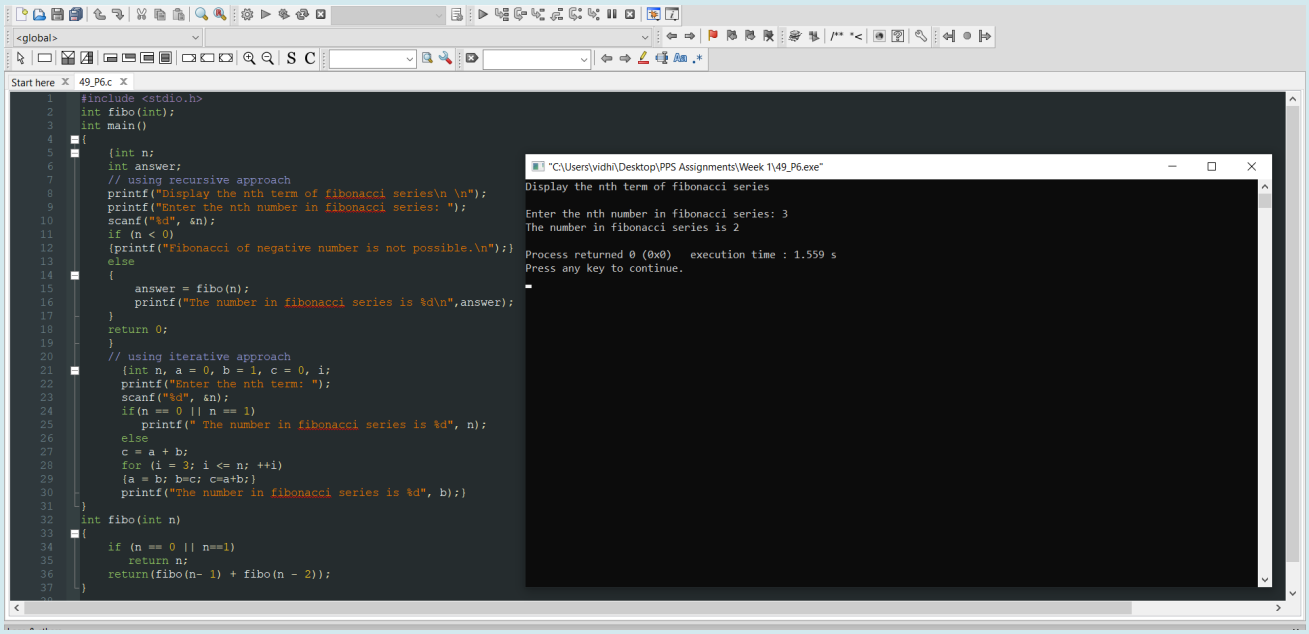


QUE - 6
WRITE A PROGRAM IN C TO PRINT N^TH TERM FIBONACCI SERIES USING RECURSION AND ITERATIVE APPROACH. WHICH ONE IS MORE EFFICIENT? EXPLAIN IN DETAIL WITH AN APPROPRIATE EXAMPLE.

Fibonacci series is the series in which each number is the sum of the two preceding numbers.Here we have declared a function named fibo.Then we ask the user to enter a number.We need to show the value of that term in Fibonacci series.

#Recursive Approach:

If the no. is -ve we print that it is not possible to print the nth term, else we call the fibo function and print the required value.Let the value entered by user be 3.As 3 is +ve we enter the else part and then fibo function is called.We now have fibo(3). As 3!=0 or 1 , the statement(fibo(n-1)+fibo(n-2) is executed.In our eg it will be fibo(3)=fibo(2) + fibo(1).Here to solve fibo(2), fibo is again called. fibo(2) = fibo(1) + fibo(0).The answer of this is 1+0= 1. Now the ans of fibo(3)=fibo(2) + fibo(1) which is equal to 1+1=2. Now this value is the ans of fibo(3).As answer= fibo(3) we get the final result printed on the screen as 2 in our example.



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QUE - 6 CONTINUED...

#Iterative approach:
Iteration simply means something which happens again and again.Here we have taken 5 variables n, a, b, c and i. C denotes the current term , b denotes the previous term and a denotes the pre previous term.
Say for example the fibo series is 1,1,2,3,5... The current term is 3 which means that c=3 , b=2 , a=1. Current term c is always the sum of it's previous two terms ie. a and b. In our program we ask the user to enter a number. Our goal is to display that particular term . In our program we first ask the user to enter a value. Let us assume that the value entered by the user is 3. This value is stored in n. Now we move to the next statements. As 3 !=0 or 1, we enter the else part. Here we have used a for loop.We have intialised the value of i here as 3. In our example as i=n, the following block of statements are executed and the final result is printed.

Recursion vs Iteration:
In the process of Recursion, a function is called again and again whereas iteration is implemented using loops. It becomes easier to write the code using recursion. Also the size of the code is reduced in recursion ; but as the function is called again and again it's execution takes longer time. Hence whenever time and space complexity are involved / concerned , Iteration is preferred over Recursion.


THANK
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