

PROGRAM ON CONTROL STATEMENTS

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1. SUM OF SERIES

Explanation:

Put simply, the sum of a series is the total the list of numbers, or terms in the series, add up to. If the sum of a series exists, it will be a single number (or fraction), like 0, $\frac{1}{2}$, or 99.

The problem of how to find the sum of a series has been around since ancient times. Archimedes' summation of $1 + \frac{1}{4} + \frac{1}{4^2} + \dots$ was one of the earliest examples. Some summations were tougher than others; the first “really tough” summation problem was $1 + (\frac{1}{2})^2 + (\frac{1}{3})^2 + \dots$, which Mengoli, and brothers Jakob Bernoulli and Johann Bernoulli tackled without success. It was Euler who found the solution ($\frac{\pi^2}{6}$) in 1734, long after Jakob Bernoulli had died [1].

Program 1:

#Series 0,2,6,12,...N

```
n=int(input("Enter the range of number(limit):"))
```

```
i=1
```

```
while(i<=n):
```

```
    print((i*i)-i,end=" ")
```

```
    i+=1
```

Output 1:

Enter the range of number(limit):7

0 2 6 12 20 30 42

Program 2:

#Series 0,2,8,14,24,34.....N

```
n=int(input("Enter the range of number(limit):"))
```

```
i=1
```

```
pr=0
```

```
while(i<=n):
```

```
    if(i%2==0):
```

```
        pr=pow(i,2)-2
```

```
        print(pr,end=" ")
```

```
    else:
```

```
        pr=pow(i,2)-1
```

```
        print(pr,end=" ")
```

ROLL NO:22CSEB49

NAME:NITHEESHLINGAM R

```
i+=1
```

Output 2:

Enter the range of number(limit):8

0 2 8 14 24 34 48 62

Program 3:

```
#Series 1 4 7 10.....N
```

```
n=int(input("Enter the range of number(limit):"))
```

```
i=1
```

```
while(i<=n+1):
```

```
    print(i)
```

```
    i=i+3
```

```
print("It's the series")
```

Output 3:

Enter the range of number(limit):40

1

4

7

10

13

16

ROLL NO:22CSEB49

NAME:NITHEESHLINGAM R

19

22

25

28

31

34

37

40

It's the series

Program 4:

#Series $1^3+2^3+3^3....N^3$

```
n=int(input("Enter the value:"))
```

```
res=0
```

```
for i in range(1,n+1):
```

```
    res=res+(i*i*i)
```

```
print("Series:",res)
```

Output 4:

Enter the value:4

Series: 100

ROLL NO:22CSEB49

NAME:NITHEESHLINGAM R

Program 5:

#Series 2+4+6+...N

```
n=int(input("Enter the range of number:"))
```

```
sum=0
```

```
i=0
```

```
while(i<=n):
```

```
    sum+=i
```

```
    i+=2
```

```
print("Series:",sum)
```

Output 5:

Enter the range of number:12

Series: 42

Program 6:

#Series 1+11+111+1111...N

```
n=int(input("Enter the number of term:"))
```

```
s=0
```

```
sum1=0
```

```
print("Series are",end=" ")
```

ROLL NO:22CSEB49

NAME:NITHEESHLINGAM R

```
for i in range(0,n):
    s=s*10+1
    print(s,end=" ")
    sum1=sum1+s
print()

print("Series sum=",sum1)
```

Output 6:

Enter the number of term:5
Series are 1 11 111 1111 11111
Series sum= 12345

Program 7:

```
#Series 9+99+999+9999...N
n=int(input("Enter the number of term:"))
s=0
sum1=0
print("Series are",end=" ")
for i in range(0,n):
    s=s*10+9
    print(s,end=" ")
```

ROLL NO:22CSEB49
NAME:NITHEESHLINGAM R

```
sum1=sum1+s
print()
print("Series sum=",sum1)
```

Output 7:

```
Enter the number of term:5
Series are 9 99 999 9999 99999
Series sum= 111105
```

Program 8:

```
#Fibonacci series
n = int(input("Enter the value of 'n': "))
a = 0
b = 1
sum = 0
count = 1
print("Fibonacci Series: ", end = " ")
while(count <= n):
    print(sum, end = " ")
    count += 1
    a = b
    b = sum
    sum = a + b
```

ROLL NO:22CSEB49
NAME:NITHEESHLINGAM R

Output 8:

Enter the value of 'n': 8

Fibonacci Series: 0 1 1 2 3 5 8 13

Program 9:

```
#Series  $1/2! + 2/3! + 3/4! + \dots + N/(N+1)!$ 
```

```
s=0
```

```
f=1
```

```
n=int(input("Enter the number:"))
```

```
for i in range(1,n+1):
```

```
    f=(f+1)*i
```

```
    s=s+(i/f)
```

```
print(s)
```

Output 9:

Enter the number:5

1.0328809767012013

Program 10:

```
#Series  $1+3+5+7+\dots+N$ 
```

```
print("Enter the range of number:")
```

ROLL NO:22CSEB49

NAME:NITHEESHLINGAM R

```
n=int(input())
sum=0
i=1
while(i<=n):
    sum+=i
    i+=2
print("Series:",sum)
```

Output 10:

Enter the range of number:51

Series: 676

Program 11:

#Series 1+2+3+4+....N

```
n=int(input("Enter the value:"))
```

```
sum=0
```

```
for i in range(1,n+1):
```

```
    sum+=i
```

```
print("Series:",sum)
```

ROLL NO:22CSEB49

NAME:NITHEESHLINGAM R

Output 11:

Enter the value:9

Series: 45

Program 12:

#Series 1!+2!+3!....N!

```
n=int(input("Enter the value:"))
```

```
fact=1
```

```
for i in range(1,n+1):
```

```
    fact=fact*i
```

```
print(fact)
```

Output 12:

Enter the value:5

120

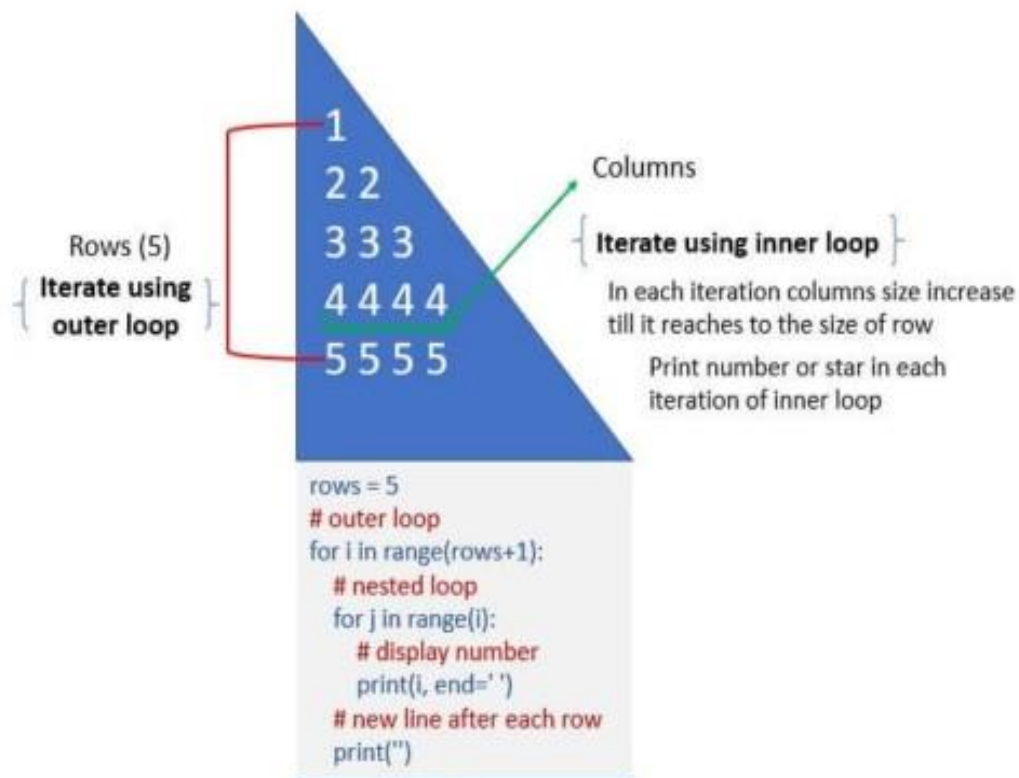
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NAME:NITHEESHLINGAM R

2.NUMBER PATTERN

Explanation:

ROLL NO:22CSEB49
NAME:NITHEESHLINGAM R



Program 1:

#Number pattern 1

```
n=int(input("Enter the number of rows:"))
```

```
for i in range(n):
```

```
    for j in range(i):
```

ROLL NO:22CSEB49

NAME:NITHEESHLINGAM R

```
print(i,end=" ")
```

```
print(" ")
```

Output 1:

Enter the number of rows:6

1

2 2

3 3 3

4 4 4 4

5 5 5 5 5

Program 2

ROLL NO:22CSEB49

NAME:NITHEESHLINGAM R

```
#Number pattern 2
n=int(input("Enter the number of rows:"))
for i in range(1,n+1):
    for j in range(1,i+1):
        print(j,end=' ')

    print(" ")
```

Output 2:

Enter the number of rows:5

1

1 2

1 2 3

1 2 3 4

1 2 3 4 5

Program 3:

```
#Number pattern 3
```

ROLL NO:22CSEB49

NAME:NITHEESHLINGAM R

```
n=int(input("Enter the number of rows:"))
b=0
for i in range(n,0,-1):
    b+=1
    for j in range(1,i+1):
        print(b,end=" ")

    print('\r')
```

Output 3:

Enter the number of rows:5

1 1 1 1 1

2 2 2 2

3 3 3

4 4

5

Program 4:

#Number pattern 4

```
n=int(input("Enter the number of rows:"))
```

ROLL NO:22CSEB49

NAME:NITHEESHLINGAM R


```
for i in range(n):  
    for j in range(i,n):  
        print('5',end=" ")  
  
    print()
```

Output 4 :

Enter the number of rows:5

5 5 5 5 5

5 5 5 5

5 5 5

5 5

5

Program 5:

#Number pattern 5

ROLL NO:22CSEB49

NAME:NITHEESHLINGAM R

```
n=int(input("Enter the number of rows:"))
i=1
while(i<=n):
    j=1
    while(j<=i):
        print((i*2-1),end=" ")
        j=j+1

    i=i+1

    print("")
```

Output 5:

Enter the number of rows:5

```
1
3 3
5 5 5
7 7 7 7
9 9 9 9 9
```

Program 6:

ROLL NO:22CSEB49

NAME:NITHEESHLINGAM R

```
#Number pattern 6
n=int(input("Enter the number of rows:"))
for i in range(1,n):
    for j in range(i,0,-1):
        print(j,end=" ")

    print(" ")
```

Output 6:

Enter the number of rows:6

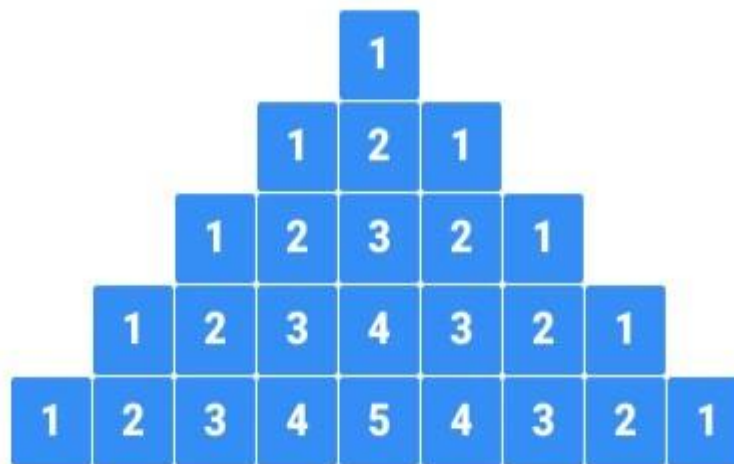
```
1
2 1
3 2 1
4 3 2 1
5 4 3 2 1
```

ROLL NO:22CSEB49
NAME:NITHEESHLINGAM R

3.PYRAMID PATTERN

Explanation:

Palindromic Pyramid Pattern



Logic for calculating elements:

Increasing half of the Pyramid



Decreasing half of the Pyramid



ROLL NO:22CSEB49

NAME:NITHEESHLINGAM R

Program 1:

#Pyramid pattern 1

```
n=int(input("Enter the number of rows:"))
```

```
for i in range(0,n):
```

```
    for j in range(0,i+1):
```

```
        print('*',end=" ")
```

```
    print("\r")
```

Output:

Enter the number of rows:5

*

* *

* * *

* * * *

ROLL NO:22CSEB49

NAME:NITHEESHLINGAM R

* * * * *

Program 2:

#Pyramid pattern 2

n=int(input("Enter the number of rows:"))

for i in range(n+1,0,-1):

 for j in range(0,i-1):

 print('*',end=" ")

print(" ")

Output 2:

Enter the number of rows:5

* * * * *

* * * *

* * *

* *

*

ROLL NO:22CSEB49

NAME:NITHEESHLINGAM R

Program 3:

#Pyramid pattern 3

```
n=int(input("Enter the number of rows:"))
```

```
for i in range(n):
```

```
    for j in range(i):
```

```
        print(" ",end="")
```

```
    for j in range(n-i):
```

```
        print("*",end=" ")
```

```
    print(" ")
```

Output 3:

Enter the number of rows:6

```
* * * * *
```

```
* * * * *
```

```
* * * *
```

```
* * *
```

```
* *
```

ROLL NO:22CSEB49

NAME:NITHEESHLINGAM R

*

Program 4:

#Pyramid pattern 4

```
n=int(input("Enter the number of rows:"))
```

```
for i in range(n):
```

```
    for j in range(i):
```

```
        print(" ",end="")
```

```
    for j in range(n-i):
```

```
        print("*",end=" ")
```

```
    print(" ")
```

Output 4:

Enter the number of rows:5

```
* * * * *
```

```
* * * *
```

```
* * *
```

```
* *
```

ROLL NO:22CSEB49

NAME:NITHEESHLINGAM R

*

Program 5:

#Pyramid pattern 5

```
n=int(input("Enter the number of rows:"))
```

```
m=(2*n)-2
```

```
for i in range(0,n):
```

```
    for j in range(0,m):
```

```
        print(end=" ")
```

```
    m=m-1
```

```
    for j in range(0,i+1):
```

```
        print("*",end=' ')
```

```
    print(" ")
```

Output 5:

Enter the number of rows:6

*

* *

ROLL NO:22CSEB49

NAME:NITHEESHLINGAM R

```

    * * *
  * * * *
* * * * *
* * * * *

```

Program 6:

#Pyramid pattern 6

```
n=int(input("Enter the number of rows:"))
```

```
for i in range(0,n):
```

```
    for j in range(0,i+1):
```

```
        print("*",end=" ")
```

```
    print("\r")
```

```
for i in range(n,0,-1):
```

```
    for j in range(0,i-1):
```

```
        print("*",end=" ")
```

```
    print("\r")
```

Output 6:

Enter the number of rows:5

```

*
* *
* * *

```

ROLL NO:22CSEB49

NAME:NITHEESHLINGAM R

* * * *

* * * * *

* * * *

* * *

* *

*

4.PROGRAMS ON CONDITIONS

Explanation:

Decimal numbers:

A decimal is a number that consists of a whole and a fractional part. Decimal numbers lie between integers and represent numerical value for quantities that are whole plus some part of a whole.

Binary numbers:

A binary number system is one of the four types of number system. In computer applications, where binary numbers are represented by only two symbols or digits, i.e. 0 (zero) and 1(one). The binary numbers here are expressed in the base-2 numeral system. For example, $(101)_2$ is a binary number. Each digit in this system is said to be a bit.

ROLL NO:22CSEB49

NAME:NITHEESHLINGAM R

Armstrong number:

An Armstrong number is a number such that the sum of its digits raised to the third power is equal to the number itself. For example, 371 is an Armstrong number, since $3^3 + 7^3 + 1^3 = 371$.

Reversing a number:

Reversing a number means changing all the digits of a number to bring the digit at the last position to the first position and vice-versa

Prime number:

Prime numbers are numbers that have only 2 factors: 1 and themselves. For example, the first 5 prime numbers are 2, 3, 5, 7, and 11.

Leap year:

To be a leap year, the year number must be divisible by four – except for end-of-century years, which must be divisible by 400

ROLL NO:22CSEB49

NAME:NITHEESHLINGAM R

Program 1:

#Decimal to binary

```
n=int(input("Enter the number:"))
```

```
sum=0
```

```
while(n>0):
```

```
    r=n%2
```

```
    sum=sum*10+r
```

```
    n=n//2
```

```
print(sum)
```

Output 1:

Enter the number:46

11101

ROLL NO:22CSEB49

NAME:NITHEESHLINGAM R

Program 2:

#Binary to decimal

```
n=int(input("Enter the num:"))
```

```
num=n
```

```
sum=0
```

```
base=1
```

```
while(n>0):
```

```
    rem=n%10
```

```
    sum=sum+rem*base
```

```
    n=n//10
```

```
    base=base*2
```

```
print(sum)
```

Output 2:

Enter the num:1101

13

Program 3:

#Armstrong number

```
n=int(input("Enter the num:"))
```

ROLL NO:22CSEB49

NAME:NITHEESHLINGAM R

```
num=n
sum=0
while(n>0):
    rem=n%10
    sum=sum+(rem**3)
    n=n//10

if(sum==num):
    print("Armstrong number")
else:
    print("Not Armstrong number")
```

Output 3:

Enter the num:153
Armstrong number

Program 4:

```
#Reversing a number
n=int(input("Enter the num:"))
num=n
sum=0
```

ROLL NO:22CSEB49
NAME:NITHEESHLINGAM R

```
while(n>0):  
    rem=n%10  
    sum=(sum*10)+rem  
    n=n//10  
  
print(sum)
```

Output 4:

Enter the num:153
351

Program 5:

```
#Prime numbers between 1 to 50  
start=int(input("Enter the lower bound:"))  
stop=int(input("Enter the upper bound:"))  
  
print("Prime numbers are:")  
  
for n in range(start,stop):  
    if(n>1):  
        for i in range(2,n):  
            if(n%i)==0:
```

ROLL NO:22CSEB49
NAME:NITHEESHLINGAM R


```
        break
    else:
        print(n,end=" ")
```

Output 5:

Enter the lower bound:1

Enter the upper bound:50

Prime numbers are:

2 3 5 7 11 13 17 19 23 29 31 37 41 43 47

Program 6:

#Leap year between 1900 to 2000

```
start=int(input("Enter the lower bound year:"))
```

```
stop=int(input("Enter the higher bound year:"))
```

```
years=[]
```

```
for year in range(start,stop+1):
```

```
    if (year%400==0):
```

```
        years.append(year)
```

```
    elif ((year%4==0)and(year%100!=0)):
```

```
        years.append(year)
```

ROLL NO:22CSEB49

NAME:NITHEESHLINGAM R

```
print(years)
```

Output 6:

Enter the lower bound year:1900

Enter the higher bound year:2000

[1904, 1908, 1912, 1916, 1920, 1924, 1928, 1932, 1936,
1940, 1944, 1948, 1952, 1956, 1960, 1964, 1968, 1972, 1976,
1980, 1984, 1988, 1992, 1996, 2000]

ROLL NO:22CSEB49

NAME:NITHEESHLINGAM R