

## **PROBLEMS ON CONTROL STATEMENTS**

### **Number series:**

**1. Write a Program to print series 0 2 6 12 20 30 42 ...N.**

### **CODE:**

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

```
i=1
```

```
while i<=n:
```

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

```
    i+=1
```

1. The sequence is  
1×2,2×3,3×4,4×5,5×6,6×  
7,.....

### **OUTPUT:**

Enter the range of number:7

0 2 6 12 20 30 42

**2. Write a Program to print series 0,2,8,14,24,34 ...N.**

### **CODE:**

```
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=" ")

    i+=1

```

### **OUTPUT:**

Enter the range of number(Limit):7

0 2 8 14 24 34 48

### **3. Write a program to print Arithmetic series 1 4 7 10...**

#### **CODE:**

```

print("Series:")

for i in range(1,10 , 3) :

    print(i, end = ' ')

```

#### **OUTPUT:**

Series:

1 4 7

3.  $a$ (first term)=1 and  
 $d$ (common difference)=3  
 Sum of  $n$  elements of series =  
 $n*(2a + (n-1)*d)/2$

### **4. Write a Program to Find the sum of series $1^3+2^3+3^3+4^3$ + $N^3$ .**

#### **CODE:**

```

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

sum=0

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

```

4.  $1*1*1=1=1*1$   
 $1*1*1+2*2*2 = 9=3*3$   
 $1*1*1+2*2*2+3*3*3=36=6*6$   
 $1*1*1+2*2*2+3*3*3+4*4*4=100=10*10$

VISHWANATH.P  
 22CSEB61

```
sum+=(i*i*i)
```

```
print("The sum of the series = ",sum)
```

### **OUTPUT:**

Enter the range of number:5

The sum of the series = 225

### **5. Write a Program to Find the sum of series 2+4+6+8. +N.**

#### **CODE:**

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

```
sum=0
```

```
i=0
```

```
while i<=n:
```

```
    sum+=i
```

```
    i+=2
```

```
print("The sum of the series = ",sum)
```

#### **OUTPUT:**

Enter the range of number:8

The sum of the series = 20

5. WKT formula for sum of continuous series that is  $n(n+1)2$

$$2(n(n+1)2)$$

$$n(n+1)$$

$$50(51)$$

$$50 \times 51 = 2550$$

Sum of this series is 2550

### **6. Write a Program to Find the sum of series 1+11+111+1111. +N.**

#### **CODE:**

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

```
print()
```

$$6.10^{n+i-10-9n/81}$$

VISHWANATH.P  
22CSEB61

```
sum = 0
```

```
str = "
```

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

```
    str = str + '1'
```

```
    sum = sum + int(str)
```

```
print(f'Sum: {sum}')
```

### **OUTPUT:**

Enter number N: 5

Sum: 12345

**7. Write a program to find the sum of series  $1/2! + 2/3! + 3/5! + 4/6! + \dots N/(N+1)!$**

### **CODE:**

```
x = int(input("Enter the value of x: "))
```

```
sum = 0
```

```
m = 1
```

```
for i in range(1, 7) :
```

```
    fact = 1
```

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

```
        fact *= j
```

```
    term = x ** i / fact
```

```
    sum += term * m
```

```
    m = m * -1
```

$$7. \ 1/2! = 1/2 = 0.5$$

$$2/3! = 2/(3*2*1) = 1/3 = 0.33$$

So the series becomes  
 $= 0.5 + 0.33 + 0.125 + 0.033 + 0.006944 \dots$

```
print("Sum =", sum)
```

### **OUTPUT:**

Enter the value of x: 2

Sum = 0.8444444444444444

### **8. Write a Program to print the Fibonacci series.**

#### **CODE:**

```
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
```

8 . $F_n = F_{n-1} + F_{n-2}$

$F_0 = 0$  and  $F_1 = 1$

Fibonacci series is 0,1,1,2,3,5,8

### **OUTPUT:**

Enter the value of 'n': 5

Fibonacci Series: 0 1 1 2 3

### 9. Write a program to find the sum of series $1+3+5+7+...+N$ .

#### CODE:

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

n=int(input())

sum=0

i=1

while(i<=n):

    sum+=i

    i+=2

print("The sum of the series = ",sum)
```

9. The sum of n terms of the series 1, 3, 5, 7, ..... is  $n^2$

#### OUTPUT:

```
Enter the range of number:
6

The sum of the series = 9
```

### 10. Write a program to find the sum of series $1+2+3+...+N$ .

#### CODE:

```
n=int(input("Enter the value of 'n' = "))

sum = 0

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

    sum+=i
```

10. Sum of  $1, 2, 3, \dots, n$  is  $\frac{n(n+1)}{2}$

```
print("Sum of the series is",sum)
```

### **OUTPUT:**

Enter the value of 'n' = 7

Sum of the series is 28

### **11. Write a Program to find the sum of series $1!+2!+3!...+n!$**

#### **CODE:**

```
n = int(input("Enter n value:"))  
fact = 1  
if(n==0):  
    fact = 1  
sum = 0  
for i in range(1,n+1):  
    fact = fact*i  
    sum = sum + fact  
print(sum)
```

11.  $1! + 2! + 3! + 4! + 5! = 1 + 2 + 6 + 24 + 120 = 153.$

### **OUTPUT:**

Enter n value:5

153

### **12. Write a Program to Find the sum of series $9+99+999+9999...+N.$**

#### **CODE:**

```
n = int(input("Enter the range of number:"))  
sum = 0
```

```
num = 9
for i in range(1,n+1):
    sum = sum + num
    num = (num*10)+9
print("The sum of the series=", sum)
```

12.  $9+99+999+9999+99999=10(105-1)-9(5)9=111105$

### **OUTPUT:**

Enter the range of number:9

The sum of the series= 111111101

### **Number Pattern:**

### **13. Python program to print the following simple number pattern**

**using a for loop.**

### **CODE:**

```
n=5
for num in range(n+1):
    for i in range (num ):
        print(num,end= " ")
    print("\r")
```

### **OUTPUT:**

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



5 5 5 5 5

#### **14.print the following half pyramid pattern of numbers**

##### **CODE:**

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

```
for i in range(1,n+1):  
    for j in range(1, i+1):  
        print(j, end="")  
    print()
```

##### **OUTPUT:**

Enter number of rows: 5

```
1  
12  
123  
1234  
12345
```

#### **Inverted pyramid pattern of numbers**

##### **CODE:**

```
row=5  
a=0  
for i in range(row,0,-1):  
    a+=1  
    for j in range(1,i+1):
```

```
print(a,end=" ")  
print("\r")
```

## **OUTPUT**

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

### **1. Inverted Pyramid pattern with the same digit**

#### **CODE:**

```
rows = 5  
num = rows  
for i in range(rows, 0, -1):  
    for j in range(0, i):  
        print(num, end=' ')  
    print("\r")
```

## **OUTPUT:**

5 5 5 5 5

5 5 5 5

5 5 5

5 5

5

## 2. Alternate numbers pattern using while loop

### CODE:

```
rows = 5
i = 1
while i <= rows:
    j = 1
    while j <= i:
        print((i * 2 - 1), end=" ")
        j = j + 1
    i = i + 1
    print("")
```

### OUTPUT:

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

## 3. Reverse Pyramid of Numbers

### CODE:

```
size= int(input("Enter the size of the series"))  
i=1  
while(i<=size):  
    j=i  
    while(j>=1):  
        print(j, end = ' ')  
        j=j-1  
    i=i+1  
    print("")
```

### **OUTPUT:**

```
Enter the size of the series5  
1  
2 1  
3 2 1  
4 3 2 1  
5 4 3 2 1
```

### **Pyramid Pattern:**

#### **4. Simple half pyramid pattern:**

### **CODE:**

```
for i in range(0,5):  
    print()  
    for j in range(0, i+1):  
        print("* ",end="")
```

### **OUTPUT:**

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

### **5. Downward half-Pyramid Pattern of Star**

#### **CODE:**

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

### **OUTPUT:**

Enter number of rows: 5

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

\*

## 6. Downward full Pyramid Pattern of star

### CODE:

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

for i in range(rows, 1, -1):

    for space in range(0, rows-i):

        print(" ", end="")

    for j in range(i, 2*i-1):

        print("* ", end="")

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

        print("* ", end="")

    print()
```

### OUTPUT:

Enter number of rows: 6

\* \* \* \* \*

\* \* \* \* \*

\* \* \* \*

\* \* \*

\*

## 7. Right down mirror star Pattern

### CODE:

```
rows = int(input("Please Enter the Total Number of Rows : "))

print("Reverse Mirrored Right Triangle Star Pattern")

for i in range(1, rows + 1):

    for j in range(1, rows + 1):

        if(j < i):

            print(' ', end = ' ')

        else:

            print('*', end = ' ')

    print()
```

### OUTPUT:

Please Enter the Total Number of Rows: 5

Reverse Mirrored Right Triangle Star Pattern

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

## 8. Equilateral triangle pattern of star

### CODE:

```
n=5  
  
for i in range(1, 6):  
  
    print(' '*n, end="")  
  
    print('* '*(i))  
  
    n-=1
```

### OUTPUT:

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



## 9. Right start pattern of star

### CODE:

```
n = 5

for i in range(n):

    for j in range(i + 1):

        print('*', end="")

    print()

for i in range(n):

    for j in range(n - i - 1):

        print('*', end="")

    print()
```

### OUTPUT:

```
*

**

***

****

*****

*****

****

***

**

*
```

## 10. Convert decimal to binary number

### CODE:

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

a=[]

while(n>0):
    d=n%2
    a.append(d)
    n=n//2

a.reverse()

print("Binary Equivalent is: ")

for i in a:
    print(i,end=" ")
```

25. Divide the number by 2.

Get the integer quotient for the next iteration.

Get the remainder for the binary digit.

Repeat the steps until the quotient is equal to 0

### OUTPUT:

Enter a number: 15

Binary Equivalent is:

1 1 1 1

## 11. Convert binary to decimal number

### CODE:

```
print("Enter the Binary Number: ")
b= int(input())
d = 0
i = 1
while b!=0:
    rem = b%10
    d = d + (rem*i)
    i = i*2
    b= int(b/10)
print("\nEquivalent Decimal Value = ", d)
```

$$26_{\text{decimal}} = d_0 \times 2^0 + d_1 \times 2^1 + d_2 \times 2^2 + \dots$$

### OUTPUT:

Enter the Binary Number:

1011

Equivalent Decimal Value = 11

## 12. Check the given number is Armstrong number

### CODE:

```
n=int(input("enter the number:"))
num=n
sum=0
while(n>0):
    rem=n%10
    sum=sum+(rem**3)
    n=n/10
if(sum==num):
    print("armstrong no")
else:
    print("not a armstrong no")
```

### OUTPUT:

```
enter the number:153
not a armstrong no
```

### 27. Reversing a Number

#### CODE:

```
number = int(input("Enter the integer number: "))
revs_number = 0
while (number > 0):
    remainder = number % 10
    revs_number = (revs_number * 10) + remainder
    number = number // 10
print("The reverse number is : {}".format(revs_number))
```

#### OUTPUT:

Enter the integer number: 123

The reverse number is : 3

The reverse number is : 32

The reverse number is : 321

```
28. lastdigit = number % 10
```

```
reverse = (reverse * 10) +  
lastdigit
```

```
number = number / 10
```

```
while (number > 0)
```

### 28. Print all the prime numbers from 1 -50

#### CODE:

```
lower_value = int(input ("Enter the Lowest Range Value: "))
upper_value = int(input ("Enter the Upper Range Value: "))
```

```
print ("The Prime Numbers in the range are: ")
for number in range (lower_value, upper_value + 1):
    if number > 1:
        for i in range (2, number):
            if (number % i) == 0:
                break
        else:
            print (number,end=",")
```

OUTPUT:

Enter the Lowest Range Value: 1

Enter the Upper Range Value: 50

The Prime Numbers in the range are:

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

29. Print all the leap year from 1900 – 2000

CODE:

```
startYear = int(input("Enter start year:"))
endYear = int(input("Enter end year:"))
for year in range(startYear,endYear):
    if(year%4==0) and (year%100!=0) or (year%400==0):
        print(year,end=" ")
```

OUTPUT:

Enter start year:1900

Enter end year:2001

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

### EXPLANATION OF PROGRAMS:

1. The sequence is  $1 \times 2, 2 \times 3, 3 \times 4, 4 \times 5, 5 \times 6, 6 \times 7, \dots$

2. The sequence is

$$1*1 -1=0$$

$$2*2 -2=2$$

$$3*3 -1=8$$

$$4*4 -2=14$$

$$5*5 -1=24$$

$$6*6 -2=34$$

3.  $a(\text{first term})=1$  and

$d(\text{common difference})=3$

$$\text{Sum of } n \text{ elements of series} = n*(2a + (n-1)*d)/2$$

4.  $1*1*1=1=1*1$

$$1*1*1+2*2*2 = 9=3*3$$

$$1*1*1+2*2*2+3*3*3=36=6*6$$

$$1*1*1+2*2*2+3*3*3+4*4*4=100=10*10$$

5. WKT formula for sum of continuous series that is  $n(n+1)/2$

$$2(n(n+1)/2)$$

$$n(n+1)$$

$$50(51)$$

$$50 \times 51 = 2550$$

Sum of this series is 2550

$$6. 10^{n+1} - 10 - 9n/81$$

7.  $1/2! = 1/2 = 0.5$

$2/3! = 2/(3*2*1) = 1/3 = 0.33$

So the series becomes  $=0.5+0.33+0.125+0.033+0.006944...$

8.  $F_n = F_{n-1} + F_{n-2}$

$F_0 = 0$  and  $F_1 = 1$

Fibonacci series is 0,1,1,2,3,5,8

9. The sum of  $n$  terms of the series 1, 3, 5, 7, ..... is  $n^2$

10. Sum of 1,2,3... $n$  is  $n(n+1)/2$

11.  $1! + 2! + 3! + 4! + 5! = 1 + 2 + 6 + 24 + 120 = 153.$

12.  $9+99+999+9999+99999=10(10^5-1)-9(5)9=111105$

25. Divide the number by 2.

Get the integer quotient for the next iteration.

Get the remainder for the binary digit.

Repeat the steps until the quotient is equal to 0

26.  $\text{decimal} = d_0 \times 2^0 + d_1 \times 2^1 + d_2 \times 2^2 + \dots$

27. 153,370,371 and 407 are examples of Armstrong numbers

For 153, the operation is  $1^3 + 5^3 + 3^3 = 153$

For 370 the operation is  $3^3 + 7^3 + 0^3 = 370$

For 371 the operation is  $3^3 + 7^3 + 1^3 = 371$

For 407 the operation is  $4^3 + 0^3 + 7^3 = 407$



28.  $\text{lastdigit} = \text{number} \% 10$

$\text{reverse} = (\text{reverse} * 10) + \text{lastdigit}$

$\text{number} = \text{number} / 10$

$\text{while } (\text{number} > 0)$

