ASSIGNMENT-2
PROBLEMS ON CONTROL STATEMENTS

NUMBER SERIES

(1)-Write a program to print series 0 2 6 12 20 30 42.

Program:

```
# program to print series 0 2 6 12 20 30 42
n=int(input('Enter number of terms : '))
j=0
k=0
for i in range(0,n):
    print(j,end=' ')
    k+=2
    j+=k
```

Explanation : j=0, k=0

i=0 ➔print(0)➔k+=2,j+=k ➔ k=2,j=2

i=1 ➔print(2)➔k+=2,j+=k ➔ k=4,j=6

i=1 ➔print(6)➔k+=2,j+=k ➔ k=6,j=12

Output:

```
Enter number of terms : 4
0 2 6 12
```

(2)-Write a program to print series 0 2 8 14 24…

Program:

```
n=int(input('Enter number of terms : '))
i=1
while(i<=n):
    if(i%2==0):
        a=(i**2)-2
    else:
        a=(i**2)-1
    print(a,end=' ')
    i+=1
```

Explanation: i=1, n=3

i=1➔

1<=3➔(1%2==0)➔FALSE➔(1**2)-1=0➔print(0)

i=2➔

2<=3➔(2%2==0)➔TRUE➔(2**2)-2=2➔print(2)

i=3➔

3<=3➔(3%2==0)➔FALSE➔(3**2)-1=8➔print(8)

Output:

```
Enter number of terms : 3
0 2 8
```

(3)-Write a program to print arithmetic series 1 4 7 10

Program:

```
n=int(input('number of terms : '))
a=1
for i in range(n):
    print(a,end=' ')
    a+=3
```

Output:
```
number of terms : 4
1 4 7 10
```

Explanation: a=1 , n=4

i=1➔ print(1) ➔ a+=3 ➔ a=4

i=2➔ print(4) ➔ a+=3 ➔ a=7

i=3➔ print(7) ➔ a+=3 ➔ a=10

i=4➔ print(10) ➔ a+=3 ➔ a=13

(4)-Write a program to find sum of cubic series.

Program:

```
n=int(input('Number of terms : '))
s=0
for i in range(1,n):
    s+=i**3
print(s)
```

Explanation: n=4, s=0

i=1 ➔ s=0+(1**3) ➔ s=1

i=2 ➔ s=1+(2**3) ➔ s=9

i=3 ➔ s=9+(3**3) ➔ s=36

i=4 ➔ s=16+(4**3) ➔ s=100

Output:
```
Number of terms : 4
100
```

(5)-Write a program to find the sum of series 2+4+6+8+…+n.

Program:

```
n=int(input('Number of terms : '))
s=0
j=2
for i in range(n):
    s+=j
    j+=2
print(s)
```

Explanation: n=4 , s=0 , j=2

i=0 ➜ s=0+2 ➜ j=2+2 ➜ s=2, j=4

i=1 ➜ s=2+4 ➜ j=4+2 ➜ s=6, j=6

i=2 ➜ s=6+6 ➜ j=6+2 ➜ s=12, j=8

i=3 ➜ s=12+8 ➜ j=8+2 ➜ s=20, j=10

Output:

```
Number of terms : 4
20
```

(6)-Write a program to find the sum of series 1+11+111+…+n.

Program:

```
n=int(input('Number of terms : '))
s=1
j=1
for i in range(n):
    s+=j
    j=j*10+1
print(s)
```

Explanation: n=4 , s=1 , j=1

i=0 ➜ s=0+1 ➜ j=1*10+1 ➜ s=1, j=11

i=1 ➜ s=1+11 ➜ j=11*10+1 ➜ s=12, j=111

i=2 ➜ s=12+111 ➜ j=111*10+1 ➜ s=123, j=1111

i=3 ➜ s=123+1111 ➜ j=1111*10+1 ➜ s=1234, j=11111

Output:

```
Number of terms : 4
1234
```

(7)-Write a program to find the sum of series 1/2!+2/3!+3/4!+…+n(n+1)!.

Program:

```
n=int(input('Number of terms : '))
a,b,s=1,2,0
for i in range(n):
    f=1
    for j in range(1,b+1):
        f=f*j
    s+=a/f
    a,b=b,b+1
print(s)
```

Explanation: n=2, a=1, b=2, s=0

i=0➔f=1➔

  j=1➔ f=1*1 ➔ f=1

  j=2➔ f=1*2 ➔ f=2

  s=0+1/2➔ a=2,b=3,s=0.5

i=1➔f=1➔

  j=1➔ f=1*1 ➔ f=1

  j=2➔ f=1*2 ➔ f=2

  j=3➔ f=2*3 ➔ f=6

  s=0.5+2/6➔ a=3,b=4,s=0.83333333333

Output:

```
Number of terms : 2
0.83333333333
```

(8)-Write a program to print the Fibonacci series.

Program:

```
n=int(input('Number of terms : '))
a,b=0,1
print(a,b,end=' ')
for i in range(2,n):
    c=a+b
    print(c,end=' ')
    a,b=b,c
```

Explanation: n=5, a=0, b=1

i=2 ➔ c=0+1 ➔ print(1) ➔ a=1,b=1

i=3 ➔ c=1+1 ➔ print(2) ➔ a=1,b=2

i=4 ➔ c=1+2 ➔ print(3) ➔ a=2,b=3

Output:

```
Number of terms : 5
0 1 1 2 3
```

(9)-Write a program to find the sum of series 1+3+5+7+…+n.

Program:

```
n=int(input('Number of terms : '))
j,s=1,0
for i in range(n):
    s+=j
    j+=2
print(s)
```

Explanation: n=3, j=1, s=0

i=0 ➔ s=0+1 ➔ j=1+2 ➔ s=1 , j=3

i=1 ➔ s=1+3 ➔ j=3+2 ➔ s=4 , j=5

i=2 ➔ s=4+5 ➔ j=5+2 ➔ s=9 , j=7

Output:

```
Number of terms : 3
9
```


(10)-Write a program to find the sum of series 1+2+3+4+…+n.

Program:

```
n=int(input('Number of terms : '))
s=0
for i in range(1,n+1):
    s+=i
print(s)
```

Explanation: n=3, s=0

i=1 ➔ s=0+1 ➔ s=1

i=2 ➔ s=1+2 ➔ s=3

i=3 ➔ s=3+3 ➔ s=6

Output:

```
Number of terms : 3
6
```

(11)-Write a program to find the sum of series 1!+2!+3!+…+n!.

Program:

```
n=int(input('Number of terms : '))
s=0
for i in range(1,n+1):
    f=1
    for j in range(1,i+1):
        f*=j
    s+=f
print(s)
```

Explanation: n=2, s=0

i=1➔ f=1➔

    j=1➔ f=1*1 ➔ s=0+1

i=2➔ f=1➔

    j=1➔ f=1*1➔ f=1

    j=2➔ f=1*2➔ f=2➔ s=1+2➔ s=3

Output:

```
Number of terms : 2
3
```

(12)-Write a program to find the sum of series 9+99+999+…+n.

Program:

```
n=int(input('Number of terms : '))
a,s=9,0
for i in range(1,n+1):
    s+=a
    a=(a+1)*10-1
print(s)
```

Explanation: n=2, s=0, a=9

i=0 ➔ s=0+9 ➔ a=(9+1)*10-1 ➔ s=9, a=99

i=2 ➔s=9+99➔ a=(99+1)*10-1 ➔ s=108, a=999

Output:

Number of terms : 2

108

NUMBER PATTERNS

(1)-Python program to print the simple number patern using for loop.

Program:

```
n=int(input('Enter number : '))
for i in range(1,n+1):
    print(str(i)*i)
```

Explanation: n=5

i=1➔ '1'*1 ➔ 1

i=2➔ '2'*2 ➔ 22

i=3➔ '3'*3 ➔ 333

i=4➔ '4'*4 ➔ 4444

i=5➔ '5'*5 ➔ 55555

Output:

```
Enter number : 5
1
22
333
4444
55555
```

(2)-Python program to print half pyramid pattern of numbers.

Program:

```
n=int(input('Enter number : '))
for i in range(1,n+1):
    for j in range(1,i+1):
        print(j,end=' ')
    print()
```

Explanation: n=3

i=1➔ j=1➔ print(1)

i=2➔ j=1➔ print(1)

         j=2➔ print(2)

i=3➔ j=1➔ print(1)

         j=2➔ print(2)

         j=3➔ print(3)

Output:

```
Enter number : 3
1
1 2
1 2 3
```

(3)-Inverted pyramid pattern of numbers.

Program:

```
n=int(input('Enter number : '))

for i in range(1,n+1):
    print(str(i)*n)
    n-=1
```

Explanation: n=5

i=1➔ '1'*5 ➔ n=4➔ 11111

i=2➔ '2'*4 ➔ n=3➔ 2222

i=3➔ '3'*3 ➔ n=2➔ 333

i=4➔ '4'*2 ➔ n=1➔ 44

i=5➔ '5'*1 ➔ n=0➔ 5

Output:

```
Enter number : 5
11111
2222
333
44
5
```

(4)-Inverted pyramid pattern with same digit.

Program:

```
n=int(input('Enter number : '))
a=n
for I in range(1,n+1):
    print(str(n)*a)
    a-=1
```

Explanation: n=5

i=1➔ '5'*5 ➔ a=4➔ 55555

i=2➔ '5'*4 ➔ a=3➔ 5555

i=3➔ '5'*3 ➔ a=2➔ 555

i=4➔ '5'*2 ➔ a=1➔ 55

i=5➔ '5'*1 ➔ a=0➔ 5

Output:

```
Enter number : 5
55555
5555
555
55
5
```

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(5)-Alternate numbers pattern using while loop.

Program:

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

`I,j=1,1`	**Explanation:** n=5,i=1, j=1
`while(j<=n):`	j=1➔ '1'*1 ➔ i=1+2,j=1+1➔ i=3,j=2
`    print(str(i)*j)`	j=2➔ '3'*2 ➔ i=3+2,j=2+1➔ i=5,j=3
`    i+=2`	j=3➔ '5'*3 ➔ i=5+2,j=3+1➔ i=7,j=4
`    j+=1`	j=4➔ '7'*4 ➔ i=7+2,j=4+1➔ i=9,j=5
Output:	j=5➔ '9'*5 ➔ i=9+2,j=5+1➔ i=11,j=6

```
Enter a number : 5
1
33
555
7777
99999
```

(6)-Reverse pyramid of numbers.

Program:

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

`for i in range(1,n+1):`	**Explanation:** n=3
`    for j in range(I,0,-1):`	i=1➔ j=1➔print('1')
`        print(str(j),end=' ')`	i=2➔ j=2➔print('2')
`    print()`	j=1➔print('1')
Output:	i=3➔ j=3➔print('3')
`Enter number : 3`	j=2➔print('2')
`3`	j=1➔print('1')

```
2 1
3 2 1
```

PYRAMID PATTERNS

(1)-Python program for simple half pyramid pattern of star.

Program:

```
n=int(input('Enter a number : '))
a='*'
for i in range(1,n+1):
    print(a*i,end=' ')
    print()
```

Explanation: n=5, a='*'

i=1➔ '*'*1 ➔ *

i=2➔ '*'*2 ➔ * *

i=3➔ '*'*3 ➔ * * *

i=4➔ '*'*4 ➔ * * * *

i=5➔ '*'*5 ➔ * * * * *

Output:

```
Enter a number : 5
*
* *
* * *
* * * *
* * * * *
```

(2)-Python program for downward half pyramid pattern of star.

Program:.

```
n=int(input('Enter a number : '))
a='*'
for i in range(n,0,-1):
    print(a*i,end=' ')
    print()
```

Explanation: n=5, a='*'

i=1➔ '*'*5 ➔ * * * * *

i=2➔ '*'*4 ➔ * * * *

i=3➔ '*'*3 ➔ * * *

i=4➔ '*'*2 ➔ * *

i=5➔ '*'*1 ➔ *

Output:

```
Enter a number : 5
* * * * *
* * * *
* * *
* *
*
```

(3)-Python program for downward pyramid pattern of star.

Program:

```
n=int(input('Number of rows : '))
a,s='*',0
for i in range(n,0,-1):
    print(' '*s,end='')
    for j in range(1,i+1):
        print(a,end=' ')
    s+=1
    print()
```

Explanation: n=3, a='*', s=0

i=3➜ ' '*0 ➜j=1➜print(*,end='')➜
     j=2➜print(*,end='')➜
     j=3➜print(*,end='')➜* * *
i=2➜ ' '*0 ➜j=1➜print(*,end='')➜
     j=2➜print(*,end='')➜ * *
i=1➜ ' '*0 ➜j=1➜print(*,end='')➜ *

Output:

```
Number of rows : 3
  * * *
   * *
    *
```

(4)-Python program for right down mirror star pattern.

Program:

```
n=int(input('Number of rows : '))
a,s='*',0
for i in range(n,0,-1):
    print(' '*s,end='')
    for j in range(1,i+1):
        print(a,end='')
    s+=1
    print()
```

Explanation: n=3, a='*', s=0

i=3➜ ' '*0 ➜j=1➜print(*,end='')➜
     j=2➜print(*,end='')➜
     j=3➜print(*,end='')➜* * *
i=2➜ ' '*0 ➜j=1➜print(*,end='')➜
     j=2➜print(*,end='')➜ * *
i=1➜ ' '*0 ➜j=1➜print(*,end='')➜ *

Output:

```
Number of rows : 3
  ***
   **
    *
```

(5)-Python program for equilateral triangle pattern of star.

Program:

```
n=int(input('Number of rows : '))

a,s='*',n

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

    print(' '*s,end='')

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

        print(a,end=' ')

    s-=1

    print()
```

Explanation: n=3, a='*', s=n

```
i=1➔ ' '*2 ➔j=1➔print(*,end=' ')➔  *

i=2➔ ' '*1 ➔j=1➔print(*,end=' ')➔
        j=2➔print(*,end=' ')➔ * *

i=3➔ ' '*0 ➔j=1➔print(*,end='')➔
            j=2➔print(*,end=' ')➔
            j=3➔print(*,end=' ')➔* * *
```

Output:

```
Number of rows : 3
  *
 * *
* * *
```

(6)-Python program for right start pattern of star.

Program:

```
n=int(input('Number of rows : '))

j=1

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

    if(i<math.ceil(n/2)-1):

        print('*'*j)

    else:

        print('*'*j)

        j-=1

    i+=1
```

Output:

```
Number of rows : 3
*
* *
*
```

Problems

(1)-Convert decimal to binary

Program:

```
n=int(input('Enter number : '))
s,b=[],''
while(n>=1):
    a=n%2
    n//=2
    s.insert(0,str(a))
for i in range(len(s)):
    b+=s[i]
print(b)
```

Explanation: n=10,

n=10➔a=10%2=0➔n=10//2=5➔s=['0']

n=5➔a=5%2=1➔n=5//2=2➔s=['1','0']

n=2➔a=2%2=0➔n=2//2=1➔s=['0','1','0']

n=1➔a=1%2=1➔n=1//2=0➔s=['1','0','1','0']

Output:

```
Enter number : 10
1010
```

(2)-Convert binary to decimal

Program:

```
n=int(input('Enter binary value : '))
i,d=0,0
while(n>0):
    r=n%10
    d+=r*(2**i)
    i+=1
    n//=10
print('The decimal value is',d)
```

Explanation : n=1010, i=0, d=0

1010>0 ➔ r=1010%10=0➔d=0+0*(2**0)

        ➔ i=1, n=101, d=0

101>0 ➔ r=101%10=1 ➔ d=0+1*(2**1)

        ➔ i=2, n=10, d=2

10>0 ➔ r=10%10=0 ➔ d=2+0*(2**2)

        ➔ i=3, n=1, d=2

1>0 ➔ r=1%10=1 ➔ d=2+1*(2**3)

        ➔ i=4, n=0, d=10

Output:

```
Enter binary value : 1010
The decimal value is 10
```

(3)-Check the give number is Armstrong number or not.

Program:

```
n=int(input('Enter number : '))
a,s=n,0
while(a>0):
    r=a%10
    s+=r**3
    a//=10
if(n==s):
    print('Armstrong number')
else:
    print('Not Armstrong number')
```

Explanation : n=153, a=153, s=0

153>0 ➔ r=153%10=3 ➔ s=0+3**3

        ➔ a=15, s=27

15>0 ➔ r=15%10=5 ➔ s=27+5**3

        ➔ a=1, s=152

1>0 ➔ r=1%10=1 ➔ s=152+1**3

        ➔ a=0, s=153

Output:

```
Enter number : 153
Armstrong number
```

(4)-Reversing a number.

Program:

```
n=int(input('Enter number : '))
s=0
while(n>0):
    r=n%10
    s=s*10+r
    n//=10
print('The reversed number is',s)
```

Explanation : n=153, s=0

153>0 ➔ r=153%10=3 ➔ s=0*10+3

➔ n=15, s=3

15>0 ➔ r=15%10=5 ➔ s=3*10+5

➔ n=1, s=35

1>0 ➔ r=1%10=1 ➔ s=35*10+1

➔ n=0, s=351

Output:

```
Enter number : 153
The reversed number is 351
```


(5)-Print all prime numbers from 1-50.

Program:

```
s=int(input('initial value : '))
e=int(input('final value : '))
for i in range(s,e+1):
    if(i>1):
        for j in range(2,int(i/2)+1):
            if(i%j==0):
                break
        else:
            print(j,end=' ')
    else:
        continue
```

Output:

```
initial value : 1
final value : 50
2 3 5 7 11 13 17 19 23 29 31 37 41 43 47
```

Explanation :

In the first two lines we take the start and end value in the variables 's' and 'e'. In the first for loop in the sequence of 1 to 50 and check the i value is greater than 1, if it is true and then the another for loop is used to check whether the number is divisible by any other number.

If the number is divisible by any number and then break the loop and goes for the next number.

(6)-Print all the leap year from 1900-2000.

Program:

```python
s=int(input('Starting year : '))
e=int(input('Ending year : '))
for i in range(s,e+1):
    if(i%4==0 and i%100!=0) or (i%400==0):
        print(i,end=',')
```

Output:

```
Starting year : 1900
Ending 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
```

Explanation:

```
S=1900, e=2000
i=1900 ➔ (1900%4==0 and 1900%100)or(1900%400==0)➔ True
        ➔ print(1900)
i=1901 ➔ (1901%4==0 and 1901%100)or(1901%400==0) ➔ False
These process continues till reaching 2000
```