

# # Logics of Pattern and Numbers

## Example

i range (1,6) and j range (1,6)

I	j	1	2	3	4	5
1		(1,1)	(1,2)	(1,3)	(1,4)	(1,5)
2		(2, 1)	(2, 2)	(2, 3)	(2, 4)	(2, 5)
3		(3, 1)	(3, 2)	(3, 3)	(3, 4)	(3, 5)
4		(4, 1)	(4, 2)	(4, 3)	(4, 4)	(4, 5)
5		(5, 1)	(5, 2)	(5, 3)	(5, 4)	(5, 5)

## 1) Question

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

## Program

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

OR

```
for i in range(1,6) :
    for j in range(1,6):
        print("*",end=" ")
    print()
```

Iteration

i	range(5)	j	range(5)
0	0 < 5 True	0 1 2 3 4 5	0 < 5 True 1 < 5 True 2 < 5 True 3 < 5 True 4 < 5 True 5 < 5 False
1	1 < 5 True	0 1 2 3 4 5	0 < 5 True 1 < 5 True 2 < 5 True 3 < 5 True 4 < 5 True 5 < 5 False
2	2 < 5 True	0 1 2 3 4 5	0 < 5 True 1 < 5 True 2 < 5 True 3 < 5 True 4 < 5 True 5 < 5 False
3	3 < 5 True	0 1 2 3 4 5	0 < 5 True 1 < 5 True 2 < 5 True 3 < 5 True 4 < 5 True 5 < 5 False
4	4 < 5 True	0 1 2 3 4 5	0 < 5 True 1 < 5 True 2 < 5 True 3 < 5 True 4 < 5 True 5 < 5 False
5	5 < 5 False	-----	-----

2) Question

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

Program

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

Iteration

i	range(5)	j	range(5)
1	1 < 5 True	1 2 3 4 5	1 < 5 True 2 < 5 True 3 < 5 True 4 < 5 True 5 < 5 False
2	2 < 5 True	1 2 3 4 5	1 < 5 True 2 < 5 True 3 < 5 True 4 < 5 True 5 < 5 False
3	3 < 5 True	1 2 3 4 5	1 < 5 True 2 < 5 True 3 < 5 True 4 < 5 True 5 < 5 False
4	4 < 5 True	1 2 3 4 5	1 < 5 True 2 < 5 True 3 < 5 True 4 < 5 True 5 < 5 False
5	5 < 5 False	-----	-----

3) Question

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

Program

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

Iteration

i	range(5)	j	range(5)
1	1 < 5 True	1 2 3 4 5	1 < 5 True 2 < 5 True 3 < 5 True 4 < 5 True 5 < 5 False
2	2 < 5 True	1 2 3 4 5	1 < 5 True 2 < 5 True 3 < 5 True 4 < 5 True 5 < 5 False
3	3 < 5 True	1 2 3 4 5	1 < 5 True 2 < 5 True 3 < 5 True 4 < 5 True 5 < 5 False
4	4 < 5 True	1 2 3 4 5	1 < 5 True 2 < 5 True 3 < 5 True 4 < 5 True 5 < 5 False
5	5 < 5 False	-----	-----

## 4) Question

```

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

## Programs

```

a = 1
for i in range(1,6) :
    for j in range(a):
        print("*",end=" ")
    print()
    a = a+1          # a += 1
```

OR

```

for i in range(1,6) :
    for j in range(1,i+1):
        print("*",end=" ")
    print()
```

## Iteration

i	range(5)	j	range(1,i+1)
1	1 < 6 True	1 2	1 < 1+1 = 2 True 2 < 1+1 = 2 False
2	2 < 6 True	1 2 3	1 < 2+1 = 3 True 2 < 2+1 = 3 True 3 < 2+1 = 3 False
3	3 < 6 True	1 2 3 4	1 < 3+1 = 4 True 2 < 3+1 = 4 True 3 < 3+1 = 4 True 4 < 3+1 = 4 False
4	4 < 6 True	1 2 3 4 5	1 < 4+1 = 5 True 2 < 4+1 = 5 True 3 < 4+1 = 5 True 4 < 4+1 = 5 True 5 < 4+1 = 5 False
5	5 < 6 True	1 2 3 4 5 6	1 < 5+1 = 6 True 2 < 5+1 = 6 True 3 < 5+1 = 6 True 4 < 5+1 = 6 True 5 < 5+1 = 6 True 6 < 5+1 = 6 False
6	6 < 6 False	-----	-----

## 5) Question

01 02 03 04  
05 06 07 08  
09 10 11 12  
13 14 15 16

## Program

```
a = 1
for i in range (1,5):
    for j in range (1,5):
        if (a <= 9):
            print("0"+str(a),end=" ")
        else :
            print(a,end=" ")
        a += 1      # a = a+1
    print()
```

## Iteration

a	i	range(1,5)	j	range(1,5)	if (a <= 9) and else	a = a+1 or a += 1
1	1	1 < 5 True	1	1<5 True	if (1 <= 9)	a = 2
2			2	2<5 True	if (2 <= 9)	a = 3
3			3	3<5 True	if (3 <= 9)	a = 4
4			4	4<5 True	if (4 <= 9)	a = 5
5			5	5<5 False	-----	-----
5	2	2 < 5 True	1	1<5 True	if (5 <= 9)	a = 6
6			2	2<5 True	if (6 <= 9)	a = 7
7			3	3<5 True	if (7 <= 9)	a = 8
8			4	4<5 True	if (8 <= 9)	a = 9
9			5	5<5 False	-----	-----
9	3	3 < 5 True	1	1<5 True	if (9 <= 9)	a = 10
10			2	2<5 True	else (10)	a = 11
11			3	3<5 True	else (11)	a = 12
12			4	4<5 True	else (12)	a = 13
13			5	5<5 False	-----	-----
13	4	4 < 5 True	1	1<5 True	else (13)	a = 14
14			2	2<5 True	else (14)	a = 15
15			3	3<5 True	else (15)	a = 16
16			4	4<5 True	else (16)	a = 17
17			5	5<5 False	-----	-----
17	5	5<5 False	-----	-----	-----	-----

## 6) Question

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20

## Program

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

## 7) Question

0	1	2
3	4	5
6	7	8

## Program

```
a = 0
for i in range (3):
    for j in range (3):
        print(a,end=" ")
        a += 1      # a = a+1
    print()
```

## 8) Question

0	-1	-2
-3	-4	-5
-6	-7	-8

## Program

```
a = 0
for i in range (3):
    for j in range (3):
        print(a,end=" ")
        a -= 1      # a = a-1
    print()
```

## 9) Question

**-1 -2 -3 -4**  
**-5 -6 -7 -8**

## Program

```
a = -1
for i in range (1,3):
    for j in range (1,5):
        print(a,end=" ")
        a -= 1      # a = a-1
    print()
```

## 10) Question

**16 15 14 13**  
**12 11 10 9**  
**8 7 6 5**  
**4 3 2 1**

## Program

```
a = 16
for i in range(1,5):
    for j in range(1,5):
        print(a,end=" ")
        a = a-1      # a -= 1
    print()
```

## 11) Question

**16 15 14 13**  
**12 11 10 09**  
**08 07 06 05**  
**04 03 02 01**

## Program

```
a = 16
for i in range(1,5):
    for j in range(1,5):
        if a <= 9 :
            print("0"+str(a),end=" ")
        else :
            print(a,end=" ")
        a = a-1      # a -= 1
    print()
```



## 12) Question

4 5 6 7  
8 9 10 11  
12 13 14 15

## Program

```
a = 4
for i in range(1,4):
    for j in range(1,5):
        print(a,end=" ")
        a = a+1      # a += 1
    print()
```

## 13) Question

2 3 4  
3 4 5  
4 5 6  
5 6 7

## Program

```
for i in range(1,5):
    for j in range(1,4):
        print(i+j,end=" ")
    print()
```

## 14) Question

3 4 5  
4 5 6  
5 6 7

## Program

```
for i in range(1,4):
    for j in range(2,5):
        print(i+j,end=" ")
    print()
```

## 15) Question

1	0	1	0
0	1	0	1
1	0	1	0
0	1	0	1

## Program

```
for i in range(1,5):
    for j in range(1,5):
        if ((i+j) % 2) == 0 :
            print("1",end=" ")
        else :
            print("0",end=" ")
    print()
```

OR

```
for i in range(1,5):
    for j in range(1,5):
        print(((i + j) -1 ) %2,end=" ")
    print()
```

## 16) Question

0	1	0	1	0
1	0	1	0	1
0	1	0	1	0

## Program

```
for i in range(1,4):
    for j in range(1,6):
        if ((i+j) % 2) != 0 :
            print("1",end=" ")
        else :
            print("0",end=" ")
    print()
```

OR

```
for i in range(1,4):
    for j in range(1,6):
        if ((i+j) % 2) == 0 :
            print("0",end=" ")
        else :
            print("1",end=" ")
    print()
```

OR

```
for i in range(1,4):
    for j in range(1,6):
        print((i + j) %2,end=" ")
    print()
```

## 17) Question

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

## Program

```
for i in range(1,5):  
    for j in range(1,5):  
        if i == 1 or j ==1 or i == 4 or j == 4 : # if (i == 1) or (j ==1) or (i == 4) or (j == 4) :  
            print("*",end=" ")  
        else :  
            print(" ",end=" ")  
    print()
```

## 18) Question

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

## Program

```
for i in range(1,4):  
    for j in range(1,4):  
        if (i==1) or (i==3) or (j==1) :  
            print("*",end=" ")  
        else :  
            print(" ",end=" ")  
    print()
```

## 19) Question

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

## Program

```
for i in range(1,4):  
    for j in range(1,4):  
        if (i==1) or (j==1) or (j==3) :  
            print("*",end=" ")  
        else :  
            print(" ",end=" ")  
    print()
```

## 20) Question

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

## Program

```
for i in range(1,4):  
    for j in range(1,4):  
        if (i==1) or (i==3) or (j==2) :  
            print("*",end=" ")  
        else :  
            print(" ",end=" ")  
    print()
```

## 21) Question

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

## Program

```
for i in range(1,5):  
    for j in range(1,5):  
        if (i == 3) or (j == 2) or ((i == 1) and (j <= 3)) :  
            print("*",end=" ")  
        else :  
            print(" ",end=" ")  
    print()
```

**OR**

```
for i in range(1,5):  
    for j in range(1,5):  
        if (i == 3) or (j == 2) or ((i == 1) and (j == 1)) or ((i == 1) and (j == 3)):  
            print("*",end=" ")  
        else :  
            print(" ",end=" ")  
    print()
```

## 22) Question

\*       \*

\*       \*

## Program

```
for i in range(1,5):
    for j in range(1,5):
        if (i==1 and j==1) or (i==1 and j==4) or (i==4 and j==1) or (i==4 and j==4) :
            print("*",end=" ")
        else :
            print(" ",end=" ")
    print()
```

## 23) Question

\*           \*

\*           \*

\*           \*

## Program

```
for i in range(1,6):
    for j in range(1,6):
        if (i==1 and j==1) or (i==1 and j==5) or (i==5 and j==1) or (i==5 and j==5) or (i==3 and j==3):
            print("*",end=" ")
        else :
            print(" ",end=" ")
    print()
```

## 24) Question

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

## Program

```
for i in range(1,6):
    for j in range(1,6):
        if (i==j) or (i+j)==6:
            print("*",end=" ")
        else :
            print(" ",end=" ")
    print()
```

## 25) Question

```
*
 *
  *
   *
    *
```

## Program

```
for i in range(1,6):
    for j in range(1,6):
        if (i==j):
            print("*",end=" ")
        else :
            print(" ",end=" ")
    print()
```

## 26) Question

```
      *
     *
    *
   *
```

## Program

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

## 27) Question

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

## Program

```
for i in range(1,6):
    for j in range(1,6):
        if (i==5) or (j==1) or (i==j):
            print("*",end=" ")
        else :
            print(" ",end=" ")
    print()
```

## 28) Question

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

## Program

```
for i in range(1,6):
    for j in range(1,6):
        if i==1 or i==5 or j==1 or j==2 or j==4 or j==5:
            print("*",end=" ")
        else :
            print(" ",end=" ")
    print()
```

## 29) Question

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

## Program

```
a = 4
for i in range(1,5):
    for j in range(a):
        print("*",end=" ")
    print()
    a -= 1 # a = a-1
```

### 30) Question

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

### Program

```
a = 1  
for i in range(1,5):  
    for j in range(a):  
        print("*",end=" ")  
    print()  
    a += 2 # a = a+2
```

### 31) Question

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

### Program

```
a = 1  
for i in range(1,5):  
    for j in range(a*2):  
        print("*",end=" ")  
    print()  
    a += 1 # a = a+1
```

OR

```
for i in range(1,5):  
    for j in range(i*2):  
        print("*",end=" ")  
    print()
```



### 32) Question

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

### Program

```
a = 1
for i in range(1,6):
    for j in range(1,a+1):
        print(j,end=" ")
    a = a+1      # a += 1
    print()
```

OR

```
for i in range(1,6):
    for j in range(1,i+1):
        print(j,end=" ")
    print()
```

### 33) Question

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

### Program

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

OR

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

### 34) Question

1	2	3	4
2	4	6	8
3	6	9	12
4	8	12	16

### Program

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

### 35) Question

(1,1)	(1,2)	(1,3)
(2,1)	(2,2)	(2,3)
(3,1)	(3,2)	(3,3)

### Program

```
for i in range(1,4):  
    for j in range(1,4):  
        print((i,j),end=" ")  
    print()
```

### 36) Question

(0,0)	(0,1)	(0,2)
(1,0)	(1,1)	(1,2)
(2,0)	(2,1)	(2,2)

### Program

```
for i in range(0,3):  
    for j in range(0,3):  
        print((i,j),end=" ")  
    print()
```

### 37) Question

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

### Program

```
a = 1
b = 2
for i in range(1,4):
    for j in range(b):
        print(" ",end=" ")
    b = b-1      # b -= 1
    for k in range(a):
        print("*",end=" ")
    print()
    a += 2      # a = a+2
```

### 38) Question

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

### Program

```
a = 1
b = 4
for i in range(1,6):
    for j in range(b):
        print(" ",end=" ")
    b = b-1      # b -= 1
    for k in range(a):
        print("*",end=" ")
    print()
    a += 2      # a = a+2
```

### 39) Question

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

### Program

```
for i in range(1,5):
    for j in range(1,4):
        if i==2 or i==3 or j==2 :
            print("*",end=" ")
        else :
            print(" ",end=" ")
    print()
```

OR

```
a = 1
b = 1
c = 3
d = 1
for i in range(1,3):
    for j in range(b):
        print(" ",end=" ")
    b = b-1      # b -= 1
    for k in range(a):
        print("*",end=" ")
    print()
    a += 2      # a = a+2

for i in range(1,3):
    for j in range(1,d):
        print(" ",end=" ")
    d = d+1      # d += 1
    for k in range(c):
        print("*",end=" ")
    c -= 2      # c = c-2
    print()
```

## 40) Question

```
  *
 * * *
  *
```

## Program

```
for i in range(1,4):
    for j in range(1,4):
        if i==2 or j==2 :
            print("*",end=" ")
        else :
            print(" ",end=" ")
    print()
```

## 41) Question

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

## Program

```
for i in range(1,4):
    for j in range(1,4):
        if (i+j)!= 4:
            print("*",end=" ")
        else :
            print(" ",end=" ")
    print()
```

OR

```
for i in range(1,4):
    for j in range(1,4):
        if (i+j)== 4:
            print(" ",end=" ")
        else :
            print("*",end=" ")
    print()
```

## 42) Question

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

## Program

```
for i in range(1,4):  
    for j in range(1,4):  
        if i==j or i==2 or j==2 :  
            print("*",end=" ")  
        else :  
            print(" ",end=" ")  
    print()
```

## 43) Question

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

## Program

```
for i in range(1,4):  
    for j in range(1,4):  
        if (i+j)==4 or i==2 or j==2 :  
            print("*",end=" ")  
        else :  
            print(" ",end=" ")  
    print()
```

## 44) Question

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

## Program

```
for i in range(1,4):  
    for j in range(1,5):  
        if (i==1 and (j>=2 and j<=3)) or (i==3 and (j>=2 and j<=3)) or (j==1 and i==2) or (j==4 and i==2) :  
            print("*",end=" ")  
        else :  
            print(" ",end=" ")  
    print()
```

## 45) Question

```

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

## Program

```
for i in range(1,6):
    for j in range(1,6):
        if (i+j) == 4 or (i+j) == 8 or (i==4 and j==2) or (i==2 and j==4) :
            print("*",end=" ")
        else :
            print(" ",end=" ")
    print()
```

OR

```
for i in range(1,6):
    for j in range(1,6):
        if (i+j)==4 or (i+j)==8 or ((i-j)==2) or ((j-i)==2):
            print("*",end=" ")
        else :
            print(" ",end=" ")
    print()
```

OR

```
for i in range(1,6):
    for j in range(1,6):
        if (i+j) == 4 or (i+j) == 8 or ((i-j) == 2) or ((i-j) == -2):
            print("*",end=" ")
        else :
            print(" ",end=" ")
    print()
```

## 46) Question

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

## Program

```
for i in range(1,6):
    for j in range(1,6):
        if i==3 or j==3 or (i==2 and (j>=2 and j<=4)) or (i==4 and (j>=2 and j<=4)) :
            print("*",end=" ")
        else :
            print(" ",end=" ")
    print()
```

OR

```
a = 1
b = 2
c = 3
d = 1
for i in range(1,4):
    for j in range(b):
        print(" ",end=" ")
    b = b-1      # b -= 1
    for k in range(a):
        print("*",end=" ")
    a += 2      # a = a+2
    print()
for i in range(1,3):
    for j in range(d):
        print(" ",end=" ")
    d = d+1      # d += 1
    for k in range(c):
        print("*",end=" ")
    c -= 2      # c = c-2
    print()
```



## 47) Question

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

## Program

```
a = 5
b = 0
for i in range(1,6):
    for j in range(b):
        print(" ",end=" ")
    b = b+1      # b += 1
    for k in range(a):
        print("*",end=" ")
    a -= 1      # a = a-1
    print()
```

OR

```
a = 5
b = 1
for i in range(1,6):
    for j in range(1,b):
        print(" ",end=" ")
    b = b+1      # b += 1
    for k in range(a):
        print("*",end=" ")
    a -= 1      # a = a-1
    print()
```

## 48) Question

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

## Program

```
a = 1
b = 4
for i in range(1,6):
    for j in range(b):
        print(" ",end=" ")
    b = b-1      # b -= 1
    for k in range(a):
        print("*",end=" ")
    a += 1      # a = a+1
    print()
```

## 49) Question

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

## Program

```
a = 4
b = 0
for i in range(1,5):
    for j in range(b):
        print(" ",end=" ")
    b = b+1      # b += 1
    for k in range(a):
        print("*",end=" ")
    a -= 1      # a = a-1
    print()
```

## 50) Question

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

## Program

```
a = 5
b = 0
for i in range(1,6):
    for j in range(b):
        print(" ",end=" ")
    b = b+1      # b += 1
    for k in range(a):
        print("*",end=" ")
    print()
```

OR

```
a = 0
for i in range(1,6):
    for j in range(a):
        print(" ",end=" ")
    a = a+1      # a += 1
    for k in range(5):      # for k in range(1,6):
        print("*",end=" ")
    print()
```

## 51) Question

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

## Program

```
a = 5
b = 4
for i in range(1,6):
    for j in range(b):
        print(" ",end=" ")
    b = b-1      # b -= 1
    for k in range(a):
        print("*",end=" ")
    print()
```

OR

```
a = 4
for i in range(1,6):
    for j in range(a):
        print(" ",end=" ")
    a = a-1      # a -= 1
    for k in range(1,6):      # for k in range(5):
        print("*",end=" ")
    print()
```