

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

* * * * *

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* * * * *

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	if (1 <= 9)	a = 2
2			2	2<5 True	if (2 <= 9)	a = 3
3	1	1 < 5 True	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			1	1<5 True	if (5 <= 9)	a = 6
6			2	2<5 True	if (6 <= 9)	a = 7
7	2	2 < 5 True	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			1	1<5 True	if (9 <= 9)	a = 10
10			2	2<5 True	else (10)	a = 11
11	3	3 < 5 True	3	3<5 True	else (11)	a = 12
12			4	4<5 True	else (12)	a = 13
13			5	5<5 False	-----	-----
13			1	1<5 True	else (13)	a = 14
14			2	2<5 True	else (14)	a = 15
15	4	4 < 5 True	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

```
* * * * *\n* * * * *\n* * * * *\n* * * * *\n* * * * *
```

Program

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

OR

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