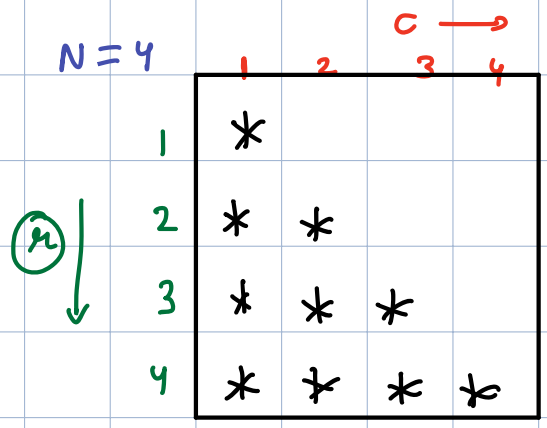
Q1. Print the foll. pattern:



row (r)	Count of *	
1	1	= r
2	2	= r
3	3	= r
4	4	= r

⇒ range (1) = [0]

range (2) = [0,1]

range (3) = [0,1,2]

range (4) = [0,1,2,3]

range (1, 5) → [1, 2, 3, 4]

range (1, N+1) (N = 4)

Outer loop ⇒ rows

Inner loop ⇒ columns.

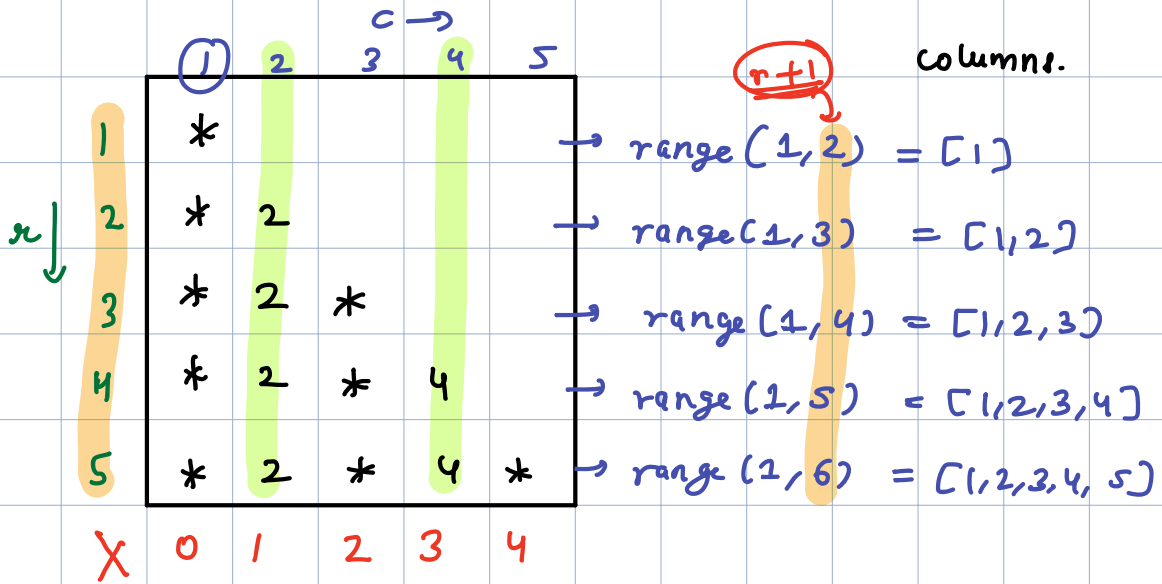
Code:

```
for r in range(1, N+1):
    # print r stars
    for c in range(r):
        print('*', end='')
    print()
```

Dry Run N = 3

Q2.

N = 5



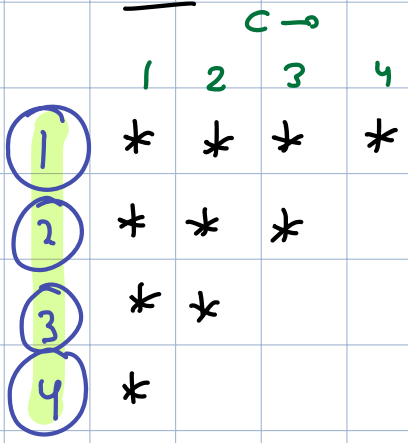
Observation

1- num is printed in even columns.

```
for r in range(1, N+1):
    # print r *s
    for c in range(1, r+1):
        if c % 2 == 1:
            print('*', end=' ')
        else:    # => even
            print(c, end=' ')
    print()
```

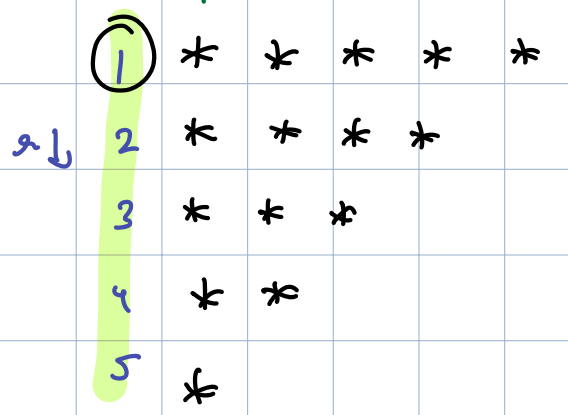
Q3.

$N = 4$



C_*		
4	$\Rightarrow N$	$= N-(1-1) = N-1+1$
3	$\Rightarrow N-1$	$= N-1 = N-(2-1) = N-2+1$
2	$\Rightarrow N-1-1$	$= N-2 = N-(3-1) = N-3+1$
1	$\Rightarrow N-1-1-1$	$= N-3 = N-(4-1) = N-4+1$

$N = 5$



C_*			
5	N	$-1,+1$	$N-1+1 = N$
4	$N-1$		$N-2+1 = N-1$
3	$N-2$		$N-3+1 = N-2$
2	$N-3$		$N-4+1 = N-3$
1	$N-4$		$N-5+1 = N-4$

$\Rightarrow$ **$N-r+1$**

$r = 1$

$N = 5$

$\text{range}(N-r+1) = \text{range}(5-1+1)$

$= \text{range}(5) = [0,1,2,3,4]$

```
for r in range (1, N+1):
    # print (N-r+1) stars.
    for c in range (N-r+1):
        print ('*', end='')
    print()
```

Pattern with Spaces

Q4.

Quiz.

```
print (' ', end='')
for r in range (4):
    print('*', end='')
print (' ', end='')
```

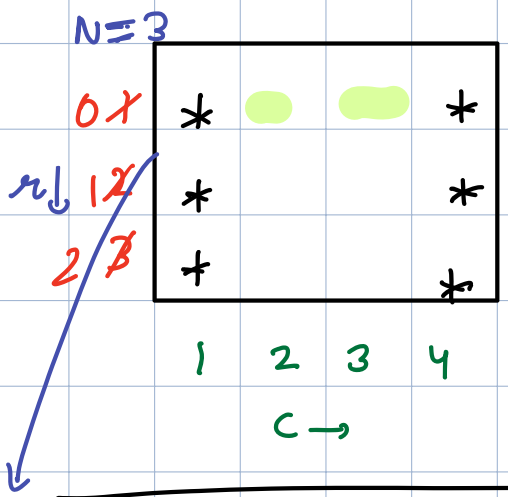
A. _ * * * * _ _

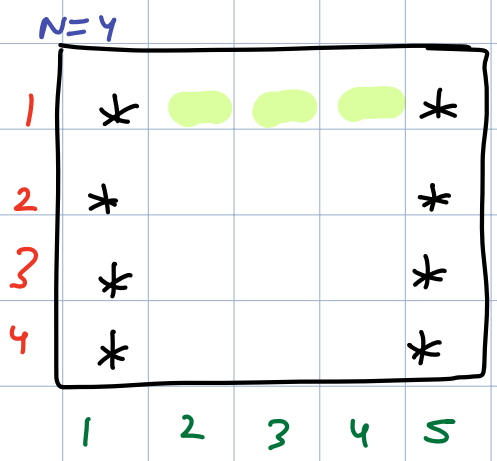
B. _ * * * * _

C. * * * * _

D. _ * * * *

Q4.





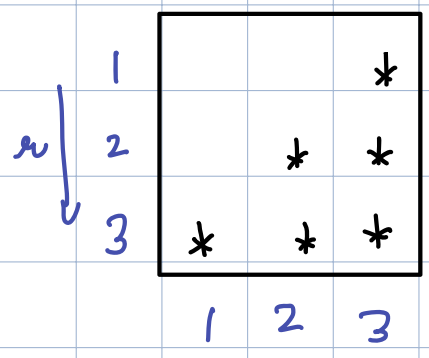

```
print('*', end='')
# print (N-1) spaces.
print('*', end='')
print()
```

⇒ repeat (N) times.

```
for x in range (N):
    print('*', end='')
    # print (N-1) spaces.
    for c in range (N-1):
        print(' ', end='')
    print('*', end='')
    print()
```

N = 3

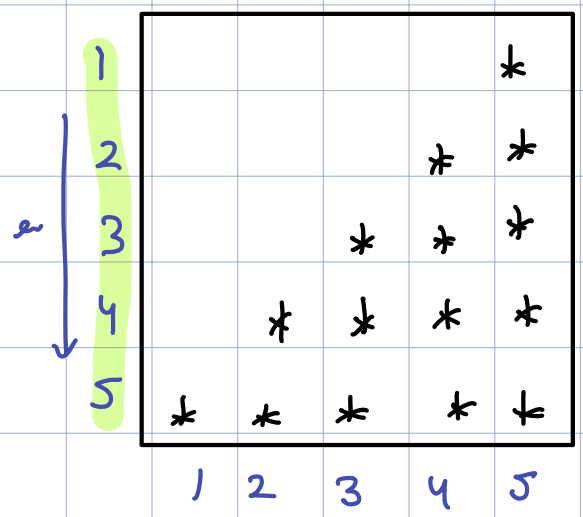
Q.S.



N = 5

N-r

C- | N-r
4 | 5-1
3 | 5-2
2 | 5-3
1 | 5-4
0 | 5-5

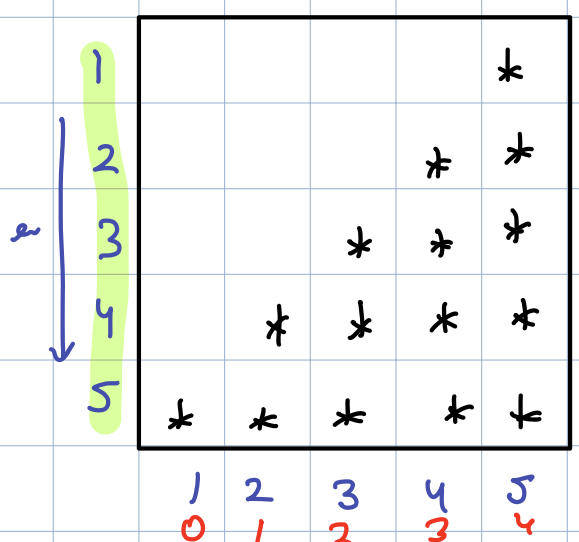


N-r

C- | N-r
4 | 5-1
3 | 5-2
2 | 5-3
1 | 5-4
0 | 5-5

C*
1
2
3
4
5

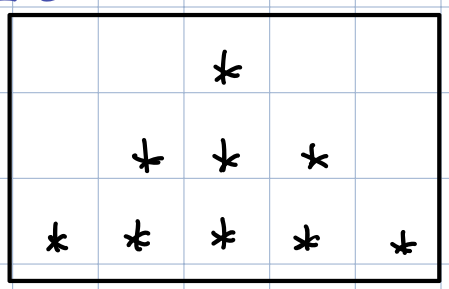
≠0 r.

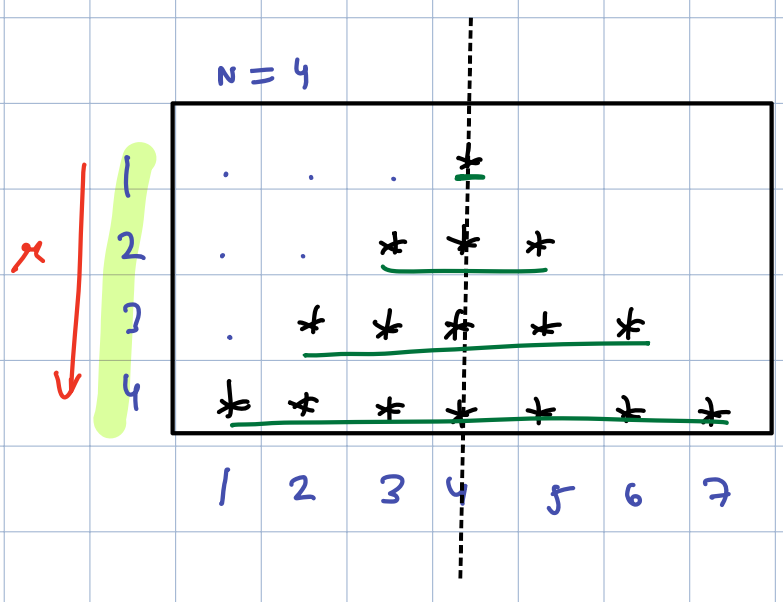


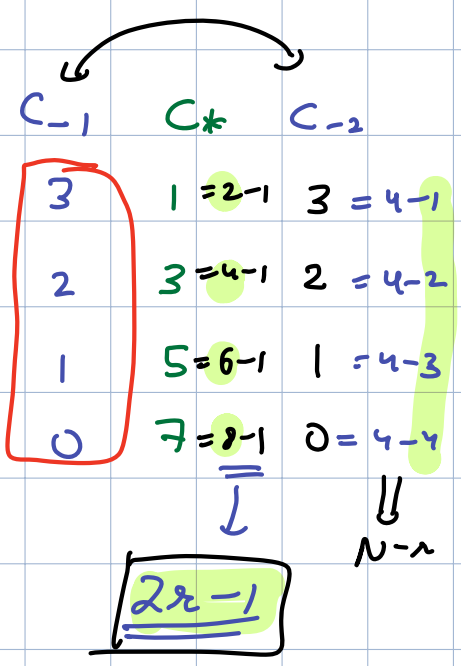
```
for r in range(1, N+1):
    # print (N-r) spaces
    for c in range(N-r):
        print(' ', end='')
    # print r *s
    for c in range(r):
        print('*', end='')
    # print new line.
    print()
```

Eg.

N = 3





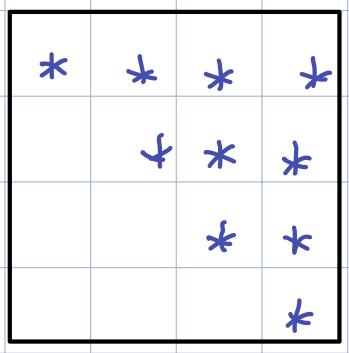


1, 3, 5, 7

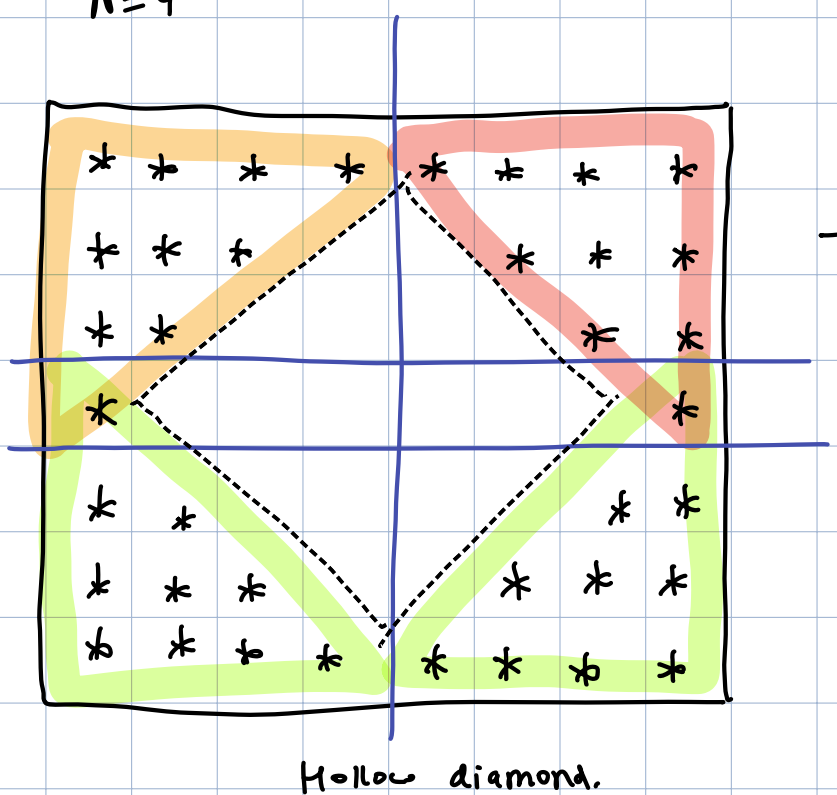
```
for r in range (1, N+1):
    # print (N-r) spaces
    ——————
    ——————
    # print (2*r -1) stars
    ——————
    ——————

    # print (N-r) spaces
    ——————
    ——————

    print()
```

Homework

(Q1) N = 4



(Q2) N = 4

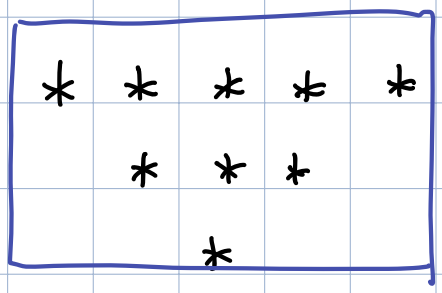


Hollow diamond.

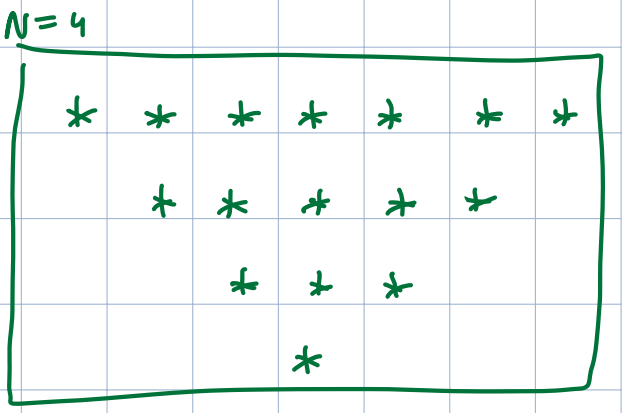
→ Replace * with space
Replace space with *
!!
Filled diamond

Q3.

N=3



N=4



Q4.

N=3