

# Let's do some more Patterns [Join Here]

Special class

Sat → 09:00 PM

Doubt  
class

Sun → 02:00 PM →

Mega class

Question → Try yourself → video delcho =

H.W → Videos

→ No. of  
Question

Practice  
purpose



# ① Full Pyramid

$N = 5$

① Rows  
 $\hookrightarrow \text{row} \in [0, N)$

0	-	-	-	-	X	-	-	-	-	-
1	.	.	.	.	X	-	X	-	.	.
2			X	-	X	-	X	-		
3		X	-	X	-	X	-	X	-	
4	X	-	X	-	X	-	X	-	X	

$N = 5$   
 $x = 0$

$N - x - 1$   
 $= 4$

Rules

$N - x - 1$   
 $5 - 3 - 1$

$x_0 \rightarrow$	4 sp	1 ★
$x_1 \rightarrow$	3 sp	2 ★
$x_2 \rightarrow$	2 sp	3 ★
$x_3 \rightarrow$	1 sp	4 ★

$N - x - 1$

"★ -" ★★

$x_4 \rightarrow 0 \text{ sp}, 5 \star$   
 $\hookrightarrow N - x - 1$   
 $5 - 4 - 1$

for each row



①

$N - \text{row} - 1$

spaces

②

$\text{row} + 1$

★

"★\_"



```
void fullPyramid(int n) {
```

$n = 5$

```
→ for (int row = 0; row < n; row++) {
```

```
// 1. spaces
```

```
for (int col = 0; col < n - row - 1; col++)
```

```
cout << " ";
```

$col < 6$     $0 < 0$     $0 < 0$

$0 < 0$

```
// 2. stars
```

```
for (int col = 0; col < row + 1; col++)
```

```
cout << "★";
```

```
cout << endl;
```

```
}
```

```
}
```

$col < 5$

$0 < 5$

N = 5

row  $\in [0, 5) \rightarrow \in [0, 4]$

row = 4  $\Rightarrow$

space  $\rightarrow$

no space

Stars

$\rightarrow$

Col = 0

-	-	-	-	X	-			
-	-	-	X	-	X	-		
-	-	X	-	X	-	X	-	
-	X	-	X	-	X	-	X	-
X	-	X	-	X	-	X	-	X

1 ✓  
2 ✓  
3 ✓  
4 ✓



# ② Inverted Pyramid Outer Loop



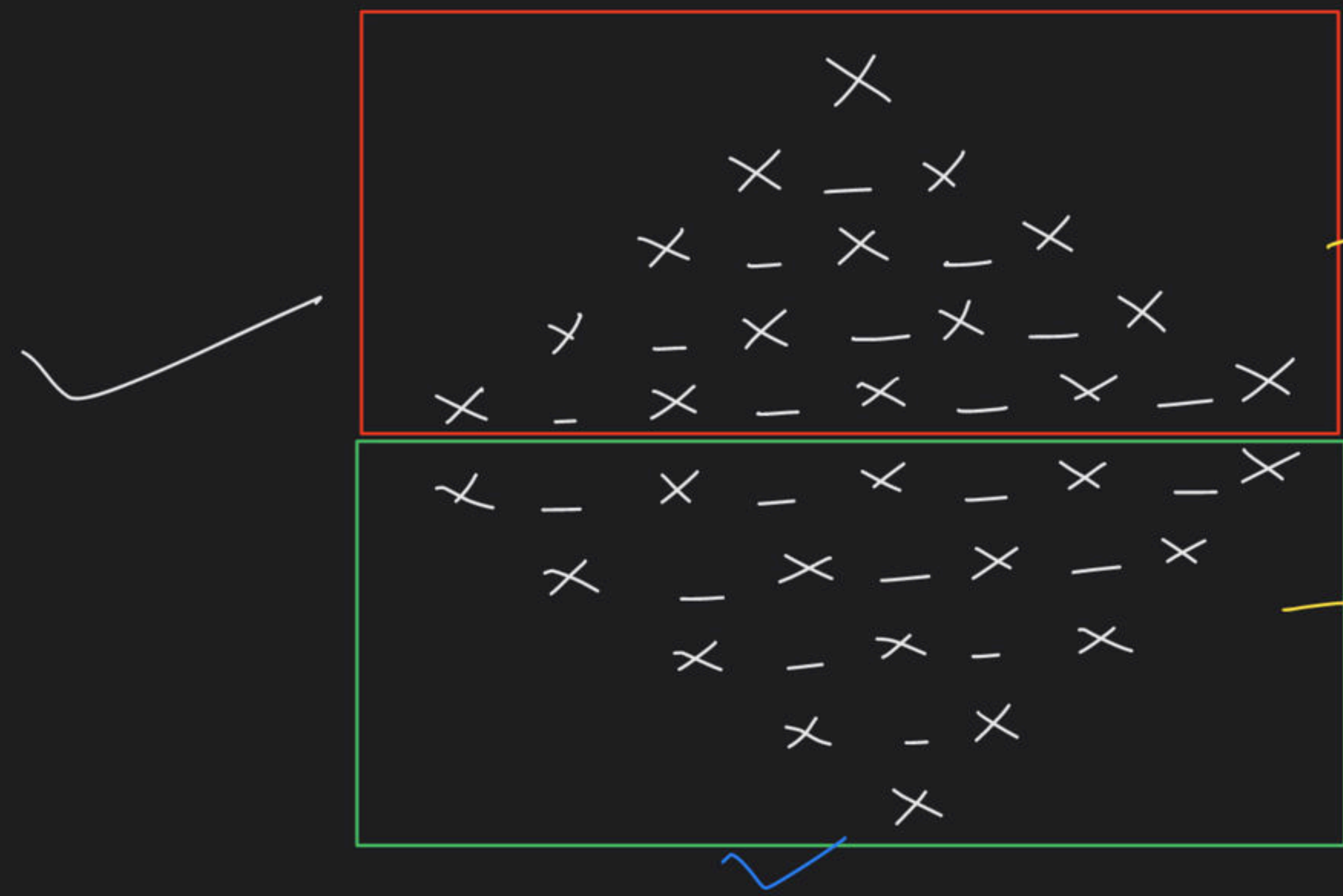
"☆"

inner loop:  $\rightarrow$

$i=0 \rightarrow$	0 sp	5 ☆
$i=1 \rightarrow$	1 sp	4 ☆
$i=2 \rightarrow$	2 sp	3 ☆
$i=3 \rightarrow$	3 sp	2 ☆
$i=4 \rightarrow$	4 sp	1 ☆

# ③ Diamond

$$N=S$$



→ I → full pyr

→ II → IFP



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# Hollow Pyramid



I need some cond<sup>n</sup> over stars

$\Rightarrow i == 0 || i == N - 1 || j == 0 ||$

$j == i$

Knuth space  $k \leq r \leq 0$

→ I star print  
spaces.

→ Last star ~~\*~~



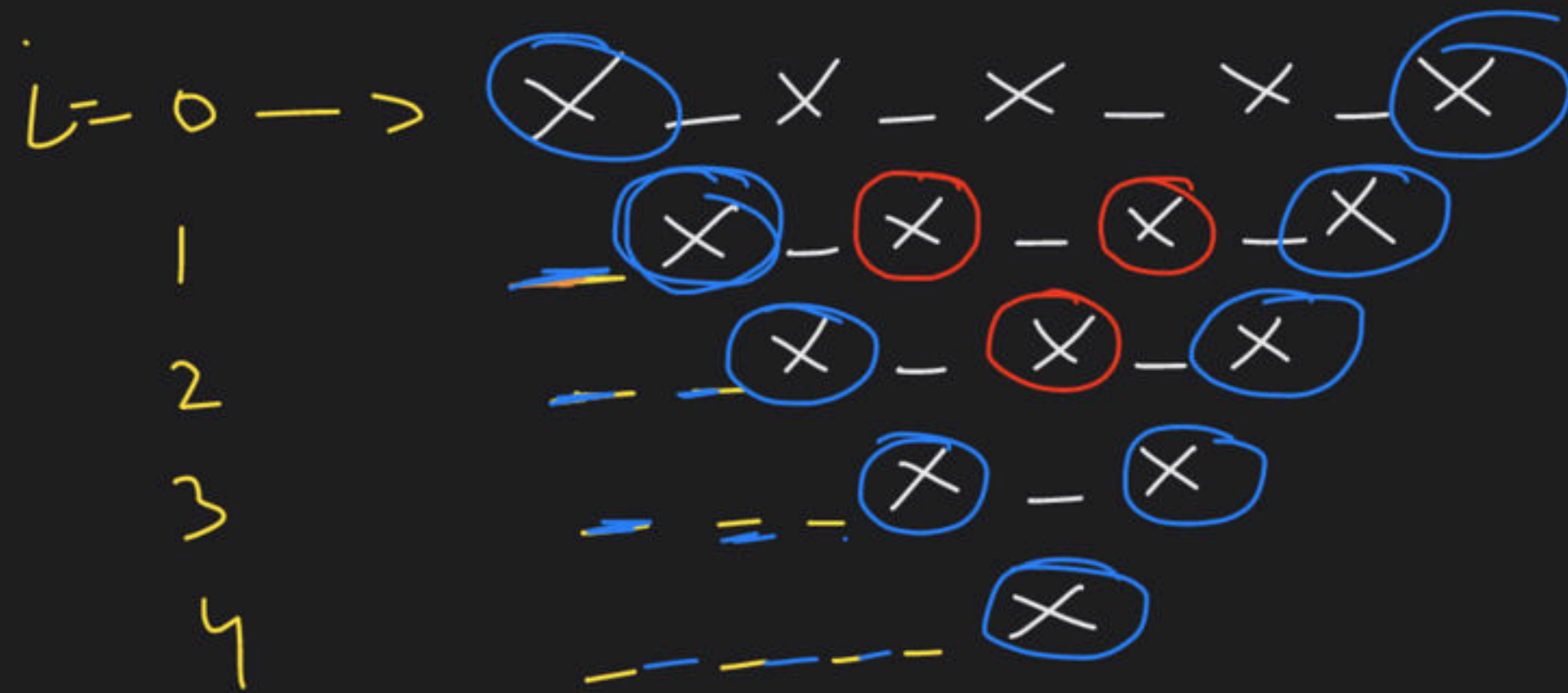
```
void hollowPyramid(int n) {  
    // leveraging full pyramid code  
    for (int i = 0; i < n; i++) {  
        // 1. spaces  
        for (int j = 0; j < n - i - 1; j++)  
            cout << " ";  
  
        // 2. stars  
        for (int j = 0; j < i + 1; j++)  
            cout << "★";  
        cout << endl;  
    }  
}
```

$j = 0$   
 $j == i$

$j \in [0, i+1)$   
0  
1  
i

# ⑤ Inverted Hollow

# Pyramid



N=5

① full inverted Pyramid

if (i==0 || i==N-1 || j==0 || j==n-i-1)

→ ~~\*\*\*~~  
eh space



```

void invertedFullPyramid(int n) {
    // outer loop
    for (int i = 0; i < n; i++) {
        // I spaces ✓
        for (int j = 0; j < i; j++)
            cout << " ";

        // II stars
        for (int j = 0; j < n - i; j++)
            cout << "★";

        cout << endl;
    }
}

```

$j \in [0, 5)$

0  
1  
2  
3  
4

4 →  $(5-1)$

→  $j == 0$

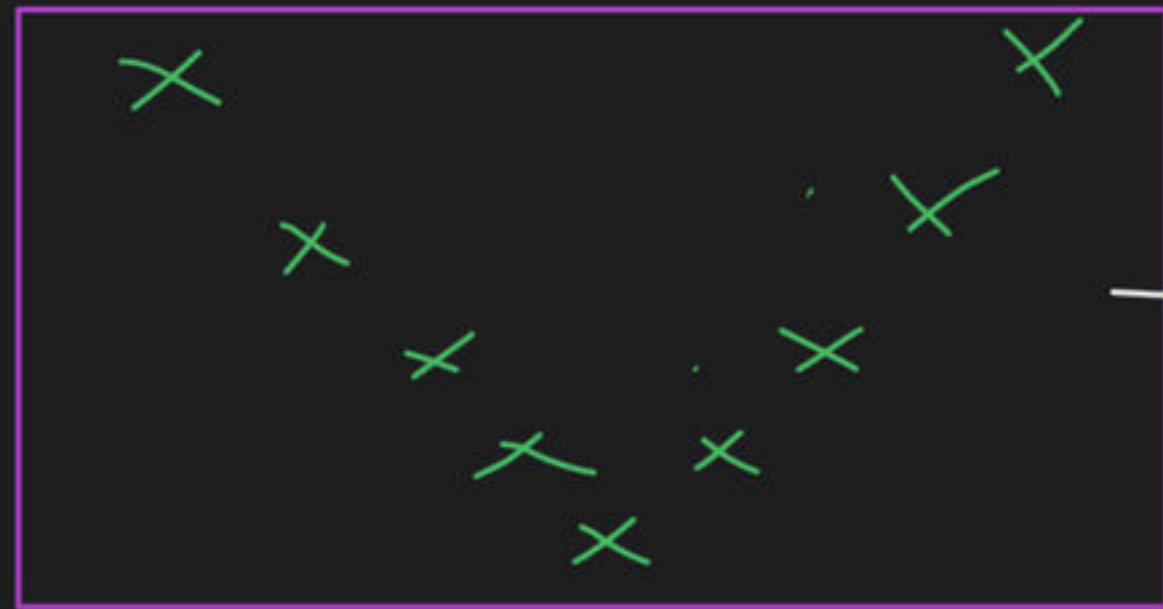
→  $j \in [0, n-i)$

$j == n-i-1$

# ⑥ Hollow Diamond



Hollow Py



INH Py

5 min

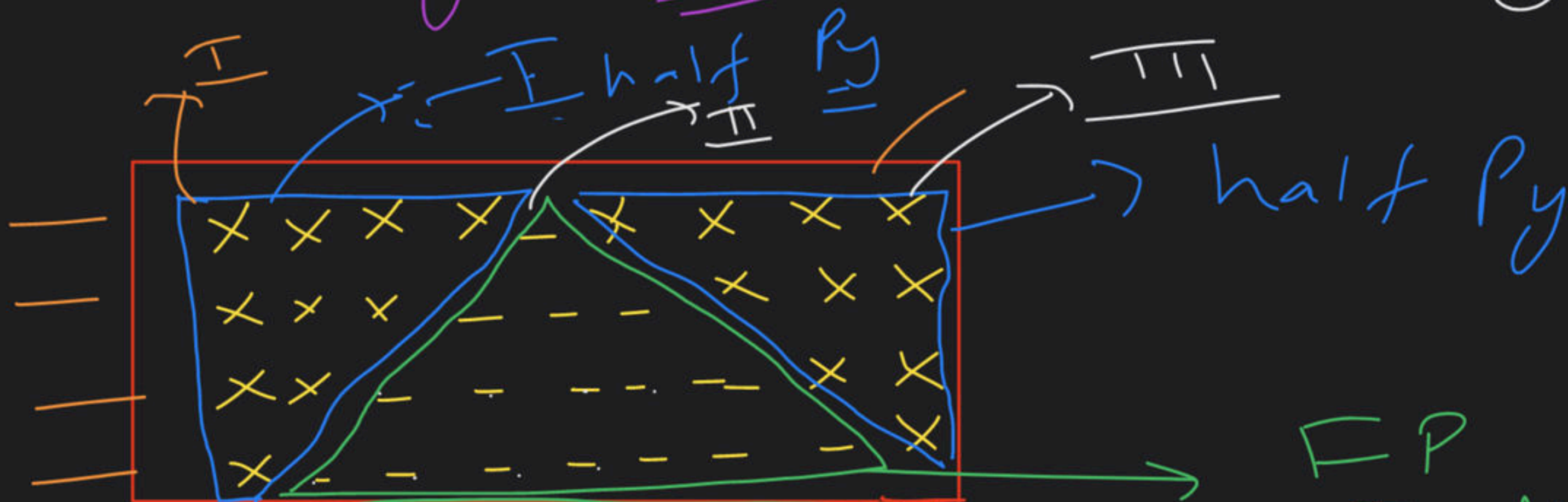


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# Min Pyramid

Outer

$N=4$



$N=4$



I → stars →  $j \in [0, n-i)$

III → ★ →  $j \in [0, n-i)$

$i=0$

$\Rightarrow \gamma_0 \rightarrow$   
 $\gamma_1 \rightarrow$   
 $\gamma_2 \rightarrow$   
 $\gamma_3 \rightarrow$

4★	1 sp	4★
3★	3 sp	3★
2★	5 sp	2★
1★	7 sp	1★

FP = all with spaces

II.

$i = \underline{0} \rightarrow \underline{1} \text{ sp}$   
 $1 \rightarrow 3$   
 $2 \rightarrow 5$   
 $3 \rightarrow 7$

$2i+1 \sim \checkmark$   
 $\downarrow 1$   
3  
5  
7

$j \in [0, 2i+1)$



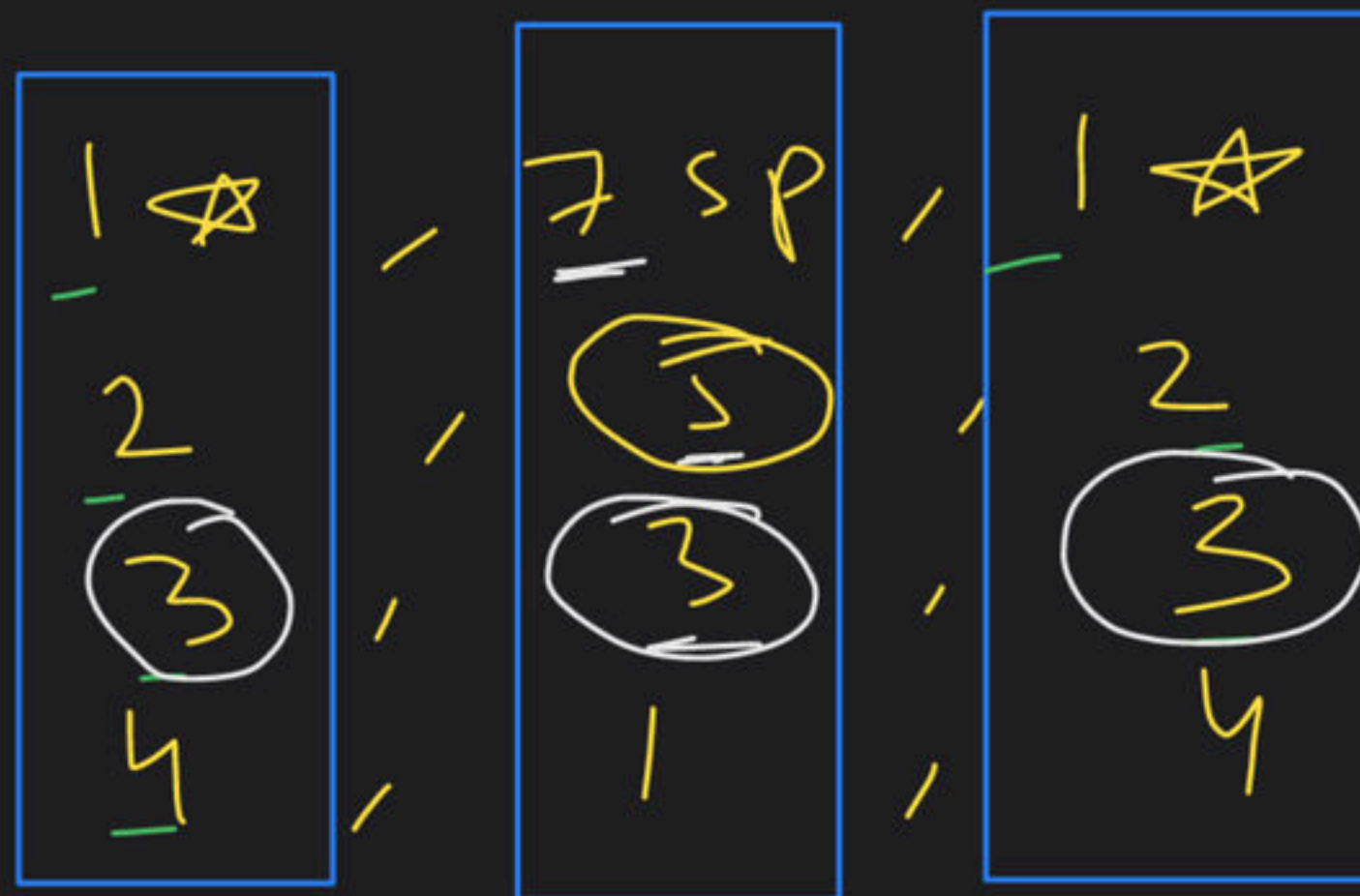
$\Rightarrow$  Part - II

$i=0 \rightarrow$   
 $r=0 \rightarrow$

1  $\rightarrow$

2  $\rightarrow$

3  $\rightarrow$



I:  $j \in [0, i+1)$

III:  $j \in [0, i+1)$

$i=2, j \in [0, 3)$   
 $\rightarrow 0 \rightarrow 1 \rightarrow 2$

II:  $\rightarrow$

$j \in [0, 2n-2i-1)$   
 $2[n-i]-1$

$i=3, j \in [0, 3)$

$i=1 \rightarrow j \in [0, 5)$

# 8 Fancy 12 Pattern

Outer loop  
↳  $i \in [0, n)$

$N=5$

$i \rightarrow 0$

$i \rightarrow 1$

$i \rightarrow 2$

$i \rightarrow 3$

$i \rightarrow 4$

2 \* 2

3 \* 3 \* 3

4 \* 4 \* 4 \* 4

5 \* 5 \* 5 \* 5 \* 5

↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑

0 1 2 3 4 5 6 7 8

↑

$j \in [0, 2i+1)$

⇒ inner loop

→ even → no.

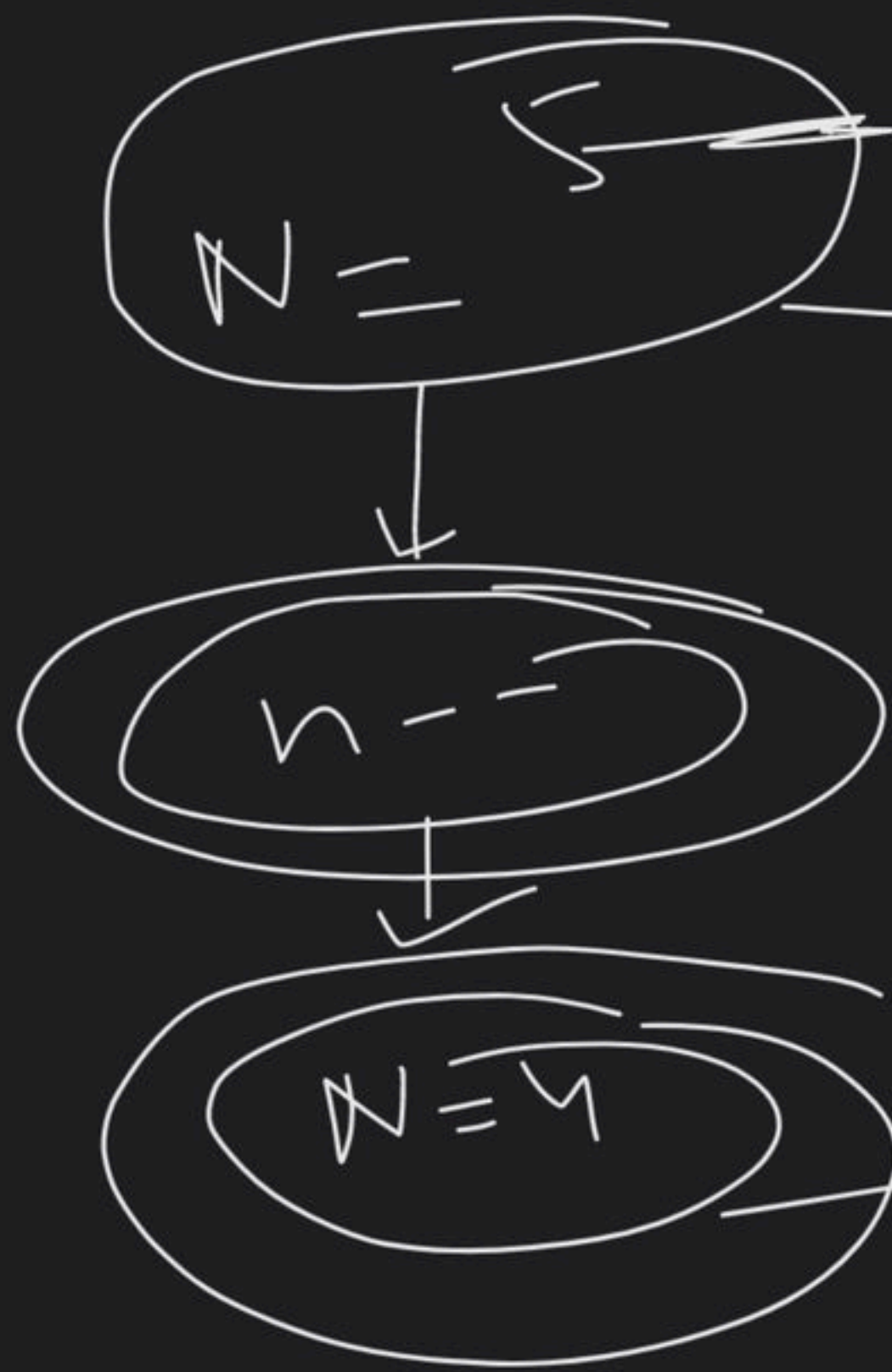
odd → \*

$i+1$



9

full fancy 12



1  
2 x 2  
3 x 3 x 3  
4 x 4 x 4 x 4  
5 x 5 x 5 x 5 x 5

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

1

1

3,

## 1 Time

$\rightarrow j \text{ even} \rightarrow n-i$  odd  $\rightarrow$  ~~A~~



10

A B C B A

0 - 1

1 - 1 2

2 - 1 2 3

3 - 1 2 3 4

4 - 1 2 3 4 5

✓  
✓

A  
A B A  
A B C B A  
A B C D C B A  
A B C D E D C B A

Outer  $\rightarrow i \in [0, 5)$

Inner loop  $\rightarrow j \in [0, i+1)$

65 → A

~~64~~ 66  
ch

```
void ABCBA(int n) {  
    for (int i = 0; i < n; i++) {  
        char ch = 'A' - 1; // ASCII 64 initialize  
        for (int j = 0; j < i + 1; j++) {  
            ch = ch + 1;  
            cout << ch;  
        }  
        cout << endl;  
    }  
}
```

ch = 64 +

ch = A + 1  
65

A  
B