Patterns

(Class Slides)

Note: We are sharing these slides as lot of mathematical logic b

Hope these will help you in your learning process

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

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

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

```
1
12
123
1234
```

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

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

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

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

Nested Loops

Loop inside a loop

$n = 4$

n

	C1	C2	C3	C4
Row1 →	1	1	1	1
R2 →	2	2	2	2
R3 →	3	3	3	3
R4 →	4	4	4	4

```
for(int i=1; i<=4; i++){
    for(int j=1; j<=4; j++){
        cout << i << " ";
    }
}
```

① Outer

② Inne

③ Wo

Print Star pattern

$n = 4$

R1	*	1st
R2	**	2 st
R3	***	3 st
R4	****	4 st

```
for (int i=1; i<=n; i++) {
    for (int j=1; j<=i; j++) {
        cout << "*"
    }
    cout << endl;
}
```

n = 4

Print Inverted Star pattern

$n = 4$

R1 **** $4 = n - i + 1$

R2 *** $3 = n - i + 1$

R3 ** $2 = n - i + 1$

R4 * $1 = n - i + 1$

n = 4

Print Half Pyramid pattern

$n = 4$

R1	1	1
R2	12	1 to 2
R3	123	1 to 3
R4	1234	1 to 4

1 to i

```
for(int i=1; i<=n; i++) {
    for(int j=1; j<=i; j++) {
        cout<<j;
    }
    endline
}
```

n = 4

Print Character Pyramid pattern

n=4

char ch = 'A'

A
BC
DEF
GHIJ

n = 4

Print Hollow Rectangle pattern

R1	* * * * *	1st + 3st + 1st
R2	* _ _ _ *	1st + 3sp + 1st
R3	* _ _ _ *	1st + 3sp + 1st
R4	* * * * *	1st + 3st + 1st

first or last → 5 stars
(1) (n)

n = 4

$n = 4$

Inverted & Rotated Half-Pyramid

— — — *	R1	3 sp	+ 1st
— — * *	R2	2 sp	+ 2st
— * * *	R3	1 sp	+ 3st
* * * *	R4	0 sp	+ 4st

	$n - i$ spaces
$i = 1$	$4 - 1 = 3$
$i = 2$	$4 - 2 = 2$
$i = 3$	$4 - 3 = 1$
$i = 4$	$4 - 4 = 0$

n = 4

① o

②

o

num = 1

Print Floyd's Triangle

R1	1					1 el
R2	2	3				2 el
R3	4	5	6			3 el
R4	7	8	9	10		4 el
R5	11	12	13	14	15	5 el

ith

i times
(1 to i)

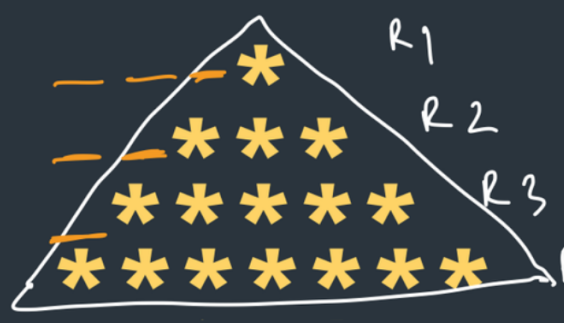
1

2

3

Diamond Pattern

$n = 4$



3sp + 1st
2sp + 3st
1sp + 5st
0sp + 7st

1st pyramid

① outer loop (1 to n)

② inner loop

a) (1

b) (1

$i=1 \rightarrow 1$ $\quad 2*i-1 = 1$

$i=2 \rightarrow 3$ $\quad 2*i-1 = 3$

$i=3 \rightarrow 5$ $\quad 2*i-1 = 5$

$i=4 \rightarrow 7$ $\quad 2*i-1 = 7$

n = 4

n=4

Diamond Pattern

2nd p

① outw

(

②

a

b

```
********   R4   0 sp + 7 st
-******   R3   1 sp + 5 st
--***      R2   2 sp + 3 st
---*       R1   3 sp + 1 st
```

2*i-1

n = 4

$n = 4$

Print Butterfly Pattern

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

R1 : 1st + 6sp + 1st

R2 : 2st + 4sp + 2st

R3 : 3st + 2sp + 3st

R4 : 4st + 0sp + 4st

$2 * (n - i)$

n = 4

$n = 4$

Print Butterfly Pattern

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

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

R4	4 st	0 sp ✓	4st
R3	3 st	2 sp ✓	3st
R2	2 st	4 sp ✓	2st
R1	1 st	6 sp ✓	1st

$2 * (n - i) = 2 * (4 - 1) = 6$

$i = 1$

n = 4