

Patterns

ABBREVIATIONS :-

- ① System.out.println() \Rightarrow Println();
- ② System.out.print() \Rightarrow Print();

Q Given N, Print N stars

Ex:- N = 5 \mapsto * * * * *

 N = 2 \mapsto * *

OBSERVATIONS :- ① We need to print N star
& all of them should be
in same line.

PSEUDO CODE :-

N = input();

for (i= 1 ; i<=N ; i++) {
 |
 | Print ("*");
 |
 | }

Q3 Given N , Print a Square of $N \times N$

$N = 5$

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

$N = 3$

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

OBSERVATION :-

- ① Outer loop is responsible for printing rows
- ② Inner loop is responsible for doing a work in one row

PSEUDO CODE :-

```
for( row=1; row<=N; row++) {
    for( col=1; col<=N; col++) {
        Print ("*");
    }
    Println();
}
```

B Given $N \times M$, print rectangle of $N \times M$ containing * in each cell.

$$N = 3, M = 5$$

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

$$N = 2, M = 6$$

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

OBSERVATIONS : Same as above

PSEUDO CODE :-

```
for (row = 1; row <= N; row++) {
    for (col = 1; col <= M; col++) {
        cout ("*");
    }
    coutln();
```

Q4 Print N as input, Print Staircase pattern

$N = 3$

*
* *
* * *

$N = 6$

*
* *
* * *
* * * *
* * * * *
* * * * * *

OBSERVATION :-

$N = 5$

*
* *
* * *
* * * *
* * * * *

Rows	Stars
1	1
2	2
3	3
4	4
5	5

CODE :-

```
for (row=1; row<=N; row++) {  
    for (col=1; col<=row; col++) {  
        cout << "*";  
    }  
    cout << endl;  
}
```

Q Given N print following pattern

$N = 4$

```
*  
* 2  
* 2 *  
* 2 * 4
```

$N = 3$

```
*  
* 2  
* 2 *
```

$N = 6$

```
*  
* 2  
* 2 *  
* 2 * 4  
* 2 * 4 *  
* 2 * 4 * 6
```

OBSERVATIONS :- ① For Even Column we will print no.

② For odd Column we will print "*" .

③ Rows & col relation is same as previous question.

PSEUDO CODE

```
for (row = 1; row <= N; row++) {
```

```
    for (col = 1; col <= row; col++) {
```

```
        if (col % 2 == 0) { // even col  
            print (col);  
        }
```

```
        else { // odd col  
            print ("*");  
        }
```

3
Println()

3

Q Given N , print following pattern.

$N = 4$

* - *
* - - *
* - - - *
* - - - - *

Space

$N = 3$

* - *
* - - *
* - - - *

$N = 5$

* - - - *
* - - - - *
* - - - - - *
* - - - - - - *
* - - - - - - - *

OBSERVATION :- ① I have to print * as beg & at end.

② I have to print $N-2$ spaces

PSEUDO CODE :-

for (row = 1 ; row <= N ; row++) {

 Print (" *");

 for (col = 1 ; col <= N-2 ; col++) {

 print (" ");

}

 Print (" *");

 Println();

}

Q7 Given N , Print the following %.

$N = 4$

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

$N = 5$

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

OBSERVATION :- ① with each row the count of "*" is decreasing.

~~$N=5$~~

② Row	Star	$(N+1)$
1	5	6
2	4	6
3	3	6
4	2	6
5	1	6

$$\therefore \text{row} + \text{Star} = N+1$$

$$\text{Star} = N+1 - \text{row}$$

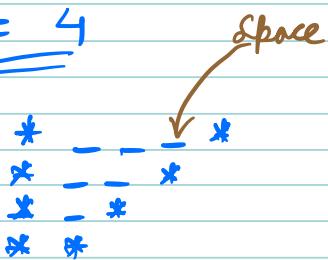
PSEUDO CODE :-

```
for( row= 1 ; row <= N; row++) {  
    for ( col= 1 ; col <= N+1-row; col++) {  
        Print (*);  
    }  
    Println();  
}
```

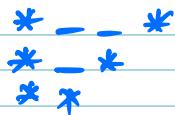
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Q8 Given N , Print the following Pattern.

$$\underline{\underline{N=4}}$$

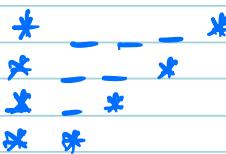


$$\underline{\underline{N=3}}$$



OBSERVATION :- ① First & the last character is "*" .

$$\boxed{\underline{\underline{N=4}}}$$



②

Row	Spaces	N
1	3	4
2	2	4
3	1	4
4	0	4

$$\therefore \text{row} + \text{Spaces} = N$$

$$\boxed{\text{Spaces} = N - \text{row}}$$

PSEUDO CODE :-

```
for (rows = 1; rows <= N; rows++) {
    Print ("*");
    for (col = 1; col <= N-rows; col++) {
        Print (" ");
    }
    Print ("*");
    Println()
}
```

3

Q Given N , Print the following pattern.

$N = 4$

```
---*  
--**  
-****  
* ****
```

$N = 5$

```
----*  
---**  
--***  
-*****  
* *****
```

OBSERVATIONS :- ① Spaces are decreasing & "*" are increasing with each row.

~~$N=4$~~

```
---*  
--**  
-****  
* ****
```

Rows	Spaces	Stars
1	3	1
2	2	2
3	1	3
4	0	4

$$\therefore \text{Row} + \text{Spaces} = N$$

$$\boxed{\text{Space} = N - \text{Row}}$$

$$\therefore \boxed{\text{Rows} = \text{Star}}$$

PSEUDO CODE :-

```
for (row = 1 ; row <= N; row++) {
```

```
    // Print Spaces
```

```
    for (col = 1; col <= N-row; col++) {
```

```
        Print(" ");
```

```
    for (col = 1; col <= row; col++) {
```

```
        Print("*");
```

```
    Println();
```

Q10 Given N , Print the following Pattern.

$N = 4$

* * # * * * *
* * * - - * * *
* * - - - - * *
* - - - - - *

$N = 3$

* * * * * *
* * - - * *
* - - - - *

- OBSERVATIONS :-
- ① In Each Row I have to first print "*", then "-", then "#".
 - ② The count of Stars in the beginning & at the end are same.

$N = 4$

* * # * * * *
* * * - - * * *
* * - - - - * *
* - - - - - *

Row St1 Space St2

1	4	0	4
2	3	2	3
3	2	4	2
4	1	6	1

$$\therefore \text{Row} + \text{St1} = N + 1$$

$$\boxed{\text{St1} = N + 1 - \text{Row}}$$

11 by

$$\boxed{\text{St2} = N + 1 - \text{Row}}$$

$$\text{Spaces} + 2 = \text{Row} * 2$$

$$\boxed{\text{Spaces} = 2 * \text{Row} - 2}$$

PSEUDO CODE :-

```
for (row = 1; row <= N; row++) {  
    for (col = 1; col <= N+1-row; col++) {  
        print ("*");  
    }  
    for (col = 1; col <= 2*row - 2; col++) {  
        print (" ");  
    }  
    for (col = 1; col <= N+1-row; col++) {  
        print ("*");  
    }  
    println();  
}
```

Q11 Given N , Print Pattern ,

N = 4

```
— — — *  
— — * * *  
— * * * * *  
* * * * * *
```

N = 3

```
— — *  
— * * *  
* * * * *
```

OBSERVATIONS :- ① We have to print "—" then "*".

N = 4

```
— — — * *  
— — * * *
```

Row	Spaces	Star
1	3	1
2	2	3
3	1	5

- * * * * * * 9 0 7

$$\therefore \text{Row} + \text{Spaces} = N$$

$$\text{spaces} = N - \text{row} ;$$

$$\therefore [\text{at Row} - 1 = \text{Star}] ;$$

CODE AS HW