Pattern Printing - 1

Lecture - 7

Raghav Garg

Ques : Print the given pattern

```
  1 2 3 4 5
1 * * * * *
2 * * * * *
3 * * * * *
```

user input → no. of rows & no. of colums
                        ↓   ↓
                   no. of lines   no. of things in
                                          each line

5 stars in 'n' lines

m → no. of stars in each line

n = 4

m = 3   →   * * *
                   * * *
                   * * *
                   * * *

Solid Rectangle

Ques : Print the given pattern

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

User input → n → side of square

Solid Square

Ques : Print the given pattern

n = 4

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

n = 3

1 2 3
1 2 3
1 2 3

n = 2

1 2
1 2

n = 1

1

```
for (int i = 1 , i <= n ; i++) {
|     cout << i ;
3
```

Number Square

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

n = 3

i = 1̸ 2̸ 3̸

j = 1̸ 2̸ 3̸ 4̸ 1̸ 2 3̸ 4̸ 1 2 3 4

Output

• 1 2 3

• 1 2 3

• 1 2 3

•

Ques : Print the given pattern

n = 4

```
1 *
2 **
3 ***
  ****
```

i = 1 2 3 4

j = 1 2 1 2 3 1 2 3 4

n = 3

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

Star Triangle

• *

• * *

• * * *

•

Ques : Print the given pattern

n = 4

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

$$\text{Row no.} + \text{no. of stars} = n+1$$

$$\text{no. of stars} = n+1-i$$

Star Triangle Reverse

Ques : Print the given pattern

1 **1**
2 **1 2**
3 **1 2 3**
4 **1 2 3 4**

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

Number Triangle

Ques : Print the given pattern

$n = 4$

```
    1   2   3   4
1   1
2   1 3
3   1 3 5
4   1 3 5 7
    j
    i
```

Odd Number Triangle

Ques : Print the given pattern

n = 4

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

→

←

1   2   3 4

1   2   3   4

1   2   3   4

1   2   3 4

65   66   67   68

65   66   67   68

Hint :   ASCII   values

Alphabet Square

Ques : Print the given pattern $(n = odd)$

```
   1 2 3 4 5
1  # # * # #        n = 5
2  # # * # #
3  * * * * *
4  # # * # #
5  # # * # #
```

```
   1 2 3
1  # * #        n = 1
2  * * *          *
3  # * #
```

$$n = 3$$

$$int \ mid = \frac{n}{2} + 1$$

Star Plus

Ques : Print the given pattern

```
   1 2 3 4 5
1  * _ _ _ *
2  _ * _ * _
3  _ _ * _ _
4  _ * _ * _
5  * _ _ _ *
```

$i + j = n + 1$

$n = 5$

```
   1   2   3   4   5
1  *
2  _   *
3  _   _   *
4  _   _   _   *
5  _   _   _   _   *
```

Star Cross

*Ques : Print the given pattern

$n = 4$

1
2 3
4 5 6
7 8 9 10

Extra Variable → bahar of outer loop

int $k = 1$, $k++$

Floyd's Triangle

*Ques : Print the given pattern

M-I : Using extra variable

if (i%2 != 0) → 1 se start

else → 0 se start

altematively

```
1  1
2  0 1
3  1 0 1
4  0 1 0 1

   n = 4
```

Binary Triangle

*Ques : Print the given pattern

```
     1   2   3   4   5   j

1    1

2    0   1

3    1   0   1

4    0   1   0   1

5    1   0   1   0   1
```

if (i == j) →   1

if   i & j both odd → 1
      i & j both even → 1

→ if (i+j % 2 == 0) → 1

Binary Triangle

*Ques : Print the given pattern

```
     1  2  3  4
1    #  #  #  *
2    #  #  *  *
3    #  *  *  *
4    *  *  *  *
```

spaces & starts
  ↓   ↓
 loop   loop

```
#  #  #        X
#  #           X  X
#              X  X  X
               X  X  X  X
```

+

n = 4

Star Triangle Flipped

*Ques : Print the given pattern n-2

```
   1 2 3 4        j
1 ___*
2 __**
3 _***
4 ****
i
```

if (i + j >= n+1)

Star Triangle Flipped

```cpp
for(int i=1;i<=n;i++){
    // spaces
    for(int j=1;j<=n-i;j++){
        cout<<" ";
    }
    // stars
    for(int k=1;k<=i;k++){
        cout<<"*";
    }
    cout<<endl;
}
```

$n = 3$

$n-i = \cancel{1} \; 0$

$i = \cancel{1} \; \cancel{2} \; 3$

$j = \cancel{1} \; 2 \; \cancel{3} \; \cancel{1} \; 2$

$k = \cancel{1} \; \cancel{2} \; 1$

        1 2 3
1   _ _ *
2   _ * *
3   * * *

Output

○ _ _ *

○ _ * *

○ * * *

○

Ques : Print the given pattern

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

→

```
_ _ _
_ _
_
```

+

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

Assignment → Sharp

Number Triangle Flipped

What's in the next lecture?

More patterns!

More interesting and with more fun!

Summarize :   nested loops

1) Square/rectangle ka structure $i \rightarrow 1\ to\ n$ $j \rightarrow 1\ to\ n$

2) Triangle →

1)

$i = 1\ to\ n$
$j = 1\ to\ i$

2)

$i = 1\ to\ n$
$j = 1\ to\ n+1-i$

3)

$i = 1\ to\ n$
$j = 1\ to\ n-i$
$K = 1\ to\ i$

3) Maths

Thank You.