

# Pattern Printing Questions

\* \* \* \*

\* \* \* \*

\* \* \* \*

[solid square]

COLLEGE  
WALLAH

# Ques : Print the given pattern

5  
 3  
 \*\*\*\*\*  
 \*\*\*\*\*  
 \*\*\*\*\*

No. of lines  $\rightarrow$  n  $\rightarrow$  [take it from user]  
 Stars in each line  $\rightarrow$  m

Nested Loops

[4-1]-[4-4]

Solid Rectangle

```
for(int i=1;i<=3;i++)  
    for(int i=1;i<=n;i++)  
        printf("*");  
    printf("\n");
```

$n = 5$

Output

\* \* \* \* \*

3

5

\* \* \* \* \*

3

\* \* \* \* \*

\* \* \* \* \*

no. of lines = no. of rows

no. of stars in each line = no. of columns

COLLEGE  
WALLAH

# HW : Print the given pattern & dry run

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

```
int n;
print
```

↓  
n=2

[4-5]

Solid Square

COLLEGE  
WALLAH

**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

$n=5$   
1 2 3 4 5  
1 2 3 4 5  
1 2 3 4 5  
1 2 3 4 5  
1 2 3 4 5

[4-6]


**Number Square**

**Ques** : Print the given pattern

$n = 4$   


```

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

$n = 2$   


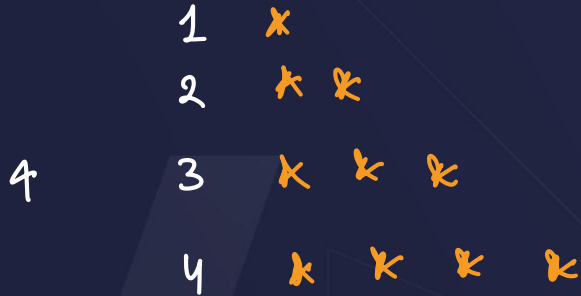
```

*
**
    
```

$n = 3$   


```

*
**
***
    
```



```

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

[4-7]

Star Triangle

COLLEGE  
WALLAH

```
for(int i=1;i<=3;i++){ // no of lines / rows -> i
    for(int j=1;j<=i;j++){ // no of columns -> j
        printf("* ");
    }
    printf("\n");
}
```

$i = 1 \ 2 \ 3 \ 4$

$j = 1 \ 2 \ 1 \ 2 \ 3 \ 1 \ 2 \ 3 \ 4$

$n = 3$

Output

```
• *
• * *
• * * *
•
```

**Ques** : Print the given pattern

$n = 4$

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

$n = 4$

[i]

i

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

Star Triangle Ula

```
for(int i=1 ; i<=n; i++)
```

```
{ for(int j=
```

$\rightarrow \backslash n$

3

[j]

4

3

2

1

$i+j = n+1$

$j = n+1-i$

[4-8] - way - 1

[4-9] - way 2

COLLEGE  
WALLAH



# FOR ANY PATTERNS:

- 1) No. of lines
- 2) In each line what is happening

COLLEGE  
WALLAH

**Ques** : Print the given pattern

$n = 4$

```

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

$n = 2$

```

1
1 2
    
```

\*

\* \*

\* \* \*

\* \* \* \*

1 2 3 4

1 2 3 4

1 2 3 4

1 2 3 4

[4-10]

Number Triangle

# HW : Print the given pattern

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

Hint

```
x x x x
x x x
x x
x
```

[4-1 1]

Number Triangle Ula

COLLEGE  
WALLAH

**Ques** : Print the given pattern [4-12] - [4-16]

$n = 4$

1  
1 3  
1 3 5  
1 3 5 7

→ 1 3 5 7  
1 3 5 7  
1 3 5 7

1 3 5 7 9 . . . 'n'

$$a_n = 1 + (n-1) \cdot 2 \Rightarrow 2n-1$$

[4-17(1)] - [4-17(2)] eitar ulta triangle form

**Odd Number Triangle**

```

        4
for(int i=1;i<=4;i++){
    for(int j=1;j<=i;j=j+2){
        printf("%d ",j);
    }
    printf("\n");
}

```

$i = 1, 2, 3, 4$

$j = 1, 3, 1, 3, 5$

1	1
1 3	1 3
1 3	1 3 5
	1 3 5 7

```

for(int i=1;i<=n;i++){
    int a = 1;
    for(int j=1;j<=i;j++){
        printf("%d ",a);
        a = a + 2;
    }
    printf("\n");
}

```

[4-16]

~~a = 3~~~~i = 2~~~~j = 1~~

n = 3

1

1 3

1 3 5

Output

• 1

• 3 5

• 7 9 11

[4-15]

COLLEGE  
WALLAH

\* **Ques** : Print the given pattern

ASCII values

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

n = 3

A B C  
A B C  
A B C

n = 5

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

[4-18]-[4-19(2)]

Alphabet Square

1 2 3

A B C

A → 65 a = 97

1 2 3 →

A B C

B → 66

1 2 3

A B C

C → 67

↓

65 66 67

(this is called type casting)

65 66 67

65 66 67



# HW : Print the given pattern [4-20]

```
A
AB
ABC
ABCD
```

→

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

2. Dry Run

## Alphabet Triangle

COLLEGE  
WALLAH

# \*HW : Print the given pattern

```

1 1
2 A B
3 1 2 3
4 A B C D
5 1 2 3 4 5
  
```

→

```

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

```

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

if - else

[4-21]

& Number  
Alphabet Triangle

**Ques** : Print the given pattern

$n$  'odd'

```

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

```

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

$n=1$   
\*

$$\frac{n}{2} + 1 \rightarrow \frac{5}{2} + 1 = 2 + 1 = 3$$

[4-22]

	j			
	1	2	3	4
i	x	x	x	x
	x	x	x	x
	x	x	x	x
	x	x	x	x

```

for (int i=1; i<=4; i++)    rows → i
{
    for (int j=1; j<=4; j++)    columns → j
    {
        printf("x");
    }
    printf("\n");
}

```

COLLEGE  
WALLAH

# HW : Print the given pattern

	1	2	3	4	5	6
1	*	*	*	*	*	*
2	*					*
3	*					*
4	*	*	*	*	*	*

$n \rightarrow \text{rows}$      $m \rightarrow \text{columns}$

[4-23]

$(i==1 \parallel i==\text{row} \parallel j==1 \parallel j==\text{column})$

logic

Hollow Rectangle

COLLEGE  
WALLAH

**Ques** : Print the given pattern

*n is odd*

*n = 5*



```
if (i == j || i + j == n + 1) print("*");
else print(" ");
```

[4-24]

Star Cross

**\*Ques** : Print the given pattern

$n=4$

1  
2 3  
4 5 6  
7 8 9 10

$n=3$

1  
2 3  
4 5 6

```
for(i=1; i<=n; i++)
{
    for(j=1; j<=i; j++)
    {
        printf(" ");
    }
}
```

[4-15] & [4-25]

6  
6 6  
6 7 6  
6 . . 6

# Homework :

1  
3 5  
7 9 11  
13 15 17 19

[4-26]

Floyd's Triangle

**\*Ques** : Print the given pattern

$n=4$   
 1 2 3 4  
 1  
 0 1  
 1 0 1  
 0 1 0 1

if  $(i \% 2 \neq 0) \rightarrow$  start with 1  
 else  $\rightarrow$  start with 0

[4-27] - [4-28]

HW :

0  
 1 0  
 0 1 0  
 1 0 1 0

$\rightarrow$  HW : [4-29]

0 & 1 Triangle



```
int a;
for(int i=1;i<=n;i++){
    if(i%2!=0) a = 1;
    else a = 0;
    for(int j=1;j<=i;j++){
        printf("%d ",a);
        if(a==0) a = 1;
        else a = 0;
    }
    printf("\n");
}
```

→ start

→ switch

$n = 4$

Output

```
• 1
• 0 1
• 1 0 1
• 0 1 0 1
```

$a = 1 \ 0 \ 1 \ 0 \ 1 \ 0$

COLLEGE  
WALLAH

$n=5$

	1	2	3	4	5
1	1✓				
2	0	1✓			
3	1	0	1✓		
4	0	1	0	1✓	
5	1	0	1	0	1✓

$\text{if } (i == j)$

$\text{) printf} ("1");$

$\text{if } (i + j \% 2 == 0) \text{ printf} ("1");$

$\text{else printf} ("0");$

COLLEGE  
WALLAH

**\*Ques** : Print the given pattern

```

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

(⇒)

```

# # #
# #
#
    
```

+

```

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

[4-30] - [3-31]

```

for (int i = 1; i <= 4; i++)
{
    for (int j = 1; j <= i; j++)
    {
        // Print pattern logic
    }
}
    
```

we will use 3 nested loop  
2 loops in 1 loop

Star Triangle Mast

$i$   
 1    # # # \*  
 2    # # \* \*  
 3    # \* \* \*  
 4    \* \* \* \*

	$j$		$k$
$i = 1$	# → 3	→ 4	
$i = 2$	# → 2	→ 4	
$i = 3$	# → 1	→ 4	
$i = 4$	# → 0	→ 4	

[o hbe]

$$i + j = n$$

$$j = n - i$$

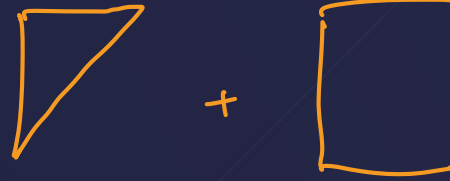
```

for (int i = 1; i <= 4; i++) {
    for (int j = 1; j <= n - i; j++) {
        printf("#");
    }
    for (int k = 1; k <= i; k++) {
        printf("*");
    }
    printf("\n");
}
  
```

# HW : Print the given pattern

```

_ _ _ * * * *
_ _ * * * *
_ * * * *
* * * *
  
```



[4-32]

Rhombus

```

_ _ _ x
_ _ x x
_ x x x
x x x x
  
```

[4-31]

n=4

```

x x x x
_ x x x
_ _ x x
_ _ _ x
_ _ _ _
  
```

nsp = 0;  
nst = n;

nsp++;  
nst--;

[4-45]

# HW : Print the given pattern

```

      A
     AB
    ABC
   ABCD
  
```



```

          A
         x x
        x x x
       x x x x
      x x x x
  
```



```

A
AB
ABC
ABCD
  
```

[4-33] - [4-34]

Alphabet Triangle

**\*Ques** : Print the given pattern

$n = 4$

```

i      K
1      _ _ _ *
2      _ _ * * *
3      _ * * * * *
4      * * * * * *
  
```



```

1      x [1]
2      x x x [3]
3      x x x x x [5]
4      x x x x x x x [7]
      ⋮
      n
  
```

```

k
x x
x x x
x x x x
  
```

1, 3, 5, 7

int nst = 1;

↳ nst = nst + 2;

$$\rightarrow a_n = 1 + (n-1) \cdot 2 \rightarrow 2^n - 1$$

K = 1; K <= n - i

$$\rightarrow a_i = 2^i - 1$$

[4-35]-[4-38]

Star Pyramid

$n = 3$

```
int nst = 1;
for(int i=1; i<=3; i++){
    for(int j=1; j<=nst; j++){
        printf("*");
    }
    nst = nst + 2;
    printf("\n");
}
```

Output

```
• *
• * * *
• * * * * *
•
```

$nst = 1, 3, 5$

$i = 1, 2$

$j = 1, 2, 1$

COLLEGE  
WALLAH



$n=4$

1    \_ \_ \_ x  
 2    \_ \_ x x x  
 3    \_ x x x x x  
 4    x x x x x x x

int nsp = 3;

int nst = 1;

[4-38]

COLLEGE  
WALLAH

# HW : Print the given pattern

```

      1
     1 2 3
    1 2 3 4 5
   1 2 3 4 5 6 7
  
```

*Clarity*

```

1
1 2 3
1 2 3 4 5
1 2 3 4 5 6 7
  
```

[4-39]

Number Pyramid

COLLEGE  
WALLAH

**\*HW** : Print the given pattern

```

      A
     A B C
    A B C D E
   A B C D E F G
  
```

[4-40]

Alphabet Pyramid

COLLEGE  
WALLAH

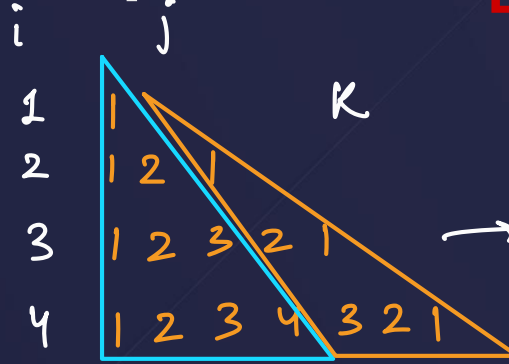
**Ques** : Print the given pattern

[4-41] [4-42]

```

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

→



→

```

i
1
2 1
3 2 1
    
```

\* Homework :

```

_ _ _ A
_ _ A B A
_ A B C B A
A B C D C B A
    
```



[4-43]

Number Pyramid Mast

**\*\*Ques** : Print the given pattern [n is odd]

i n=7

```

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

Power of nst & nsp

nsp --  
 nst += 2  
 n=3

X  
 X X  
 X X X  
 X X X  
 X X X  
 X  
 n=5

$(\frac{n}{2} + 1)^{th}$  line  $\rightarrow$  middle line

middle line  $\rightarrow$  nsp = 0  
 nst = n

[4-44]

Star Diamond

$n \rightarrow$  no. of lines = 5,  $ml = 3$

$$nsp = \frac{n}{2} = 2 \times 0.5$$

$$nst = 1; 3; 5$$

Output

```
for(int i=1;i<=n;i++){
    for(int j=1;j<=nsp;j++){ // spaces
        printf(" ");
    }
    for(int k=1;k<=nst;k++){ // stars
        printf("*");
    }
    if(i<ml){
        nsp--;
        nst+=2;
    }
    else{
        nsp++;
        nst-=2;
    }
    printf("\n");
}
```

1    \_ \_ \*

2    \_ \* \* \*

3    \* \* \* \* \*

4    \_ \* \* \*

5    \_ \_ \*

•    \_ \_ \*

•    \_ \* \* \*

•    \* \* \* \* \*

•    \_ \* \* \*

•    \_ \_ \*

$i = 1$

# Ques : Print the given pattern

\*\*\*\*\*

```

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

nst = 3

nsb = 1

nsb += 2

nst --

[4-46]



```

x x x
x x
x
    
```

+

```

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

+

```

x x x
x x
x
    
```

Number Pyramid Mast

**\*Ques** : Print the given pattern

1 2 3 4 5 6 7  $n=4$

1	1	2	3	4	5	6	7
2	1	2	3	—	5	6	7
3	1	2	—	—	—	6	7
4	1	—	—	—	—	—	7

$n=2$

1 2 3

1 — 3

$n=3$

1 2 3 4 5

1 2 — 4 5

1 — — — 5

[4-47] - [4-48]

Number Pyramid Mast

COLLEGE  
WALLAH



```

for(int i=1;i<=3n;i++){
    int a = 1;
    for(int j=1;j<=nst;j++){ // stars
        printf("%d",a);
        a++;
    }
    for(int k=1;k<=nsp;k++){ // spaces
        printf(" ");
        a++;
    }
    for(int j=1;j<=nst;j++){ // stars
        printf("%d",a);
        a++;
    }
    nst--;
    nsp+=2;
    printf("\n");
}

```

1    1 2 3 \_ 5 6 7  
 2    1 2 \_ \_ \_ 6 7  
 3    1 \_ \_ \_ \_ 7

$nst = 2$

$nsp = 3$

$i = 1, 2$

$a = 1, 2, 3, 4, 5, 6, 7, 8$

Output

• 1 2 3 \_ 5 6 7

• 1 2 \_ \_ \_ 6 7

**\*HW : Print the given pattern**

```

A B C D E F G
A B C   E F G
A B       F G
A           G
    
```

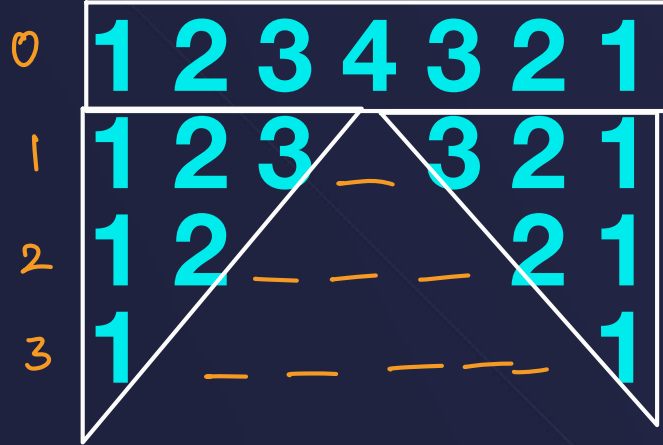
Same

[4-49]

Number Pyramid Mast

COLLEGE  
WALLAH

**\*HW : Print the given pattern**



1 2 3      —      3 2 1  
 1 2      +      — — —      +      2 1  
 1      — — — — —      1

[4-50]

[4-51]

Number Pyramid Mast

COLLEGE  
WALLAH

**\*\*Ques : Print the given pattern**

	1	2	3	4	5	6	7
1	4	4	4	4	4	4	4
2	4	3	3	3	3	3	4
3	4	3	2	2	2	3	4
4	4	3	2	1	2	3	4
5	4	3	2	2	2	3	4
6	4	3	3	3	3	3	4
7	4	4	4	4	4	4	4

$n=4$   
' $2n-1$ ' lines

[4-52]-[4-54]

3	3	3	3	3
3	2	2	2	3
3	2	1	2	3
3	2	2	2	3
3	3	3	3	3

$n=3$

[4-54]

Number Pyramid Mast

	1	2	3	4	3	2	1
	1	2	3	4	5	6	7
1	1	1	1	1	1	1	1
2	1	2	2	2	2	2	1
3	1	2	3	3	3	2	1
4	1	2	3	4	3	2	1
3	1	2	3	3	3	2	1
2	1	2	2	2	2	2	1
1	1	1	1	1	1	1	1

$\min$

$1 \rightarrow 4$   
 $2 \rightarrow 3$   
 $3 \rightarrow 2$   
 $4 \rightarrow 1$

$n = 4$

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

$\min(i, j)$

$j = 1 \ 2 \ 3 \ 4 \ 5 \ 6 \ 7$   
 $b = 1 \ 2 \ 3 \ 4 \ 3 \ 2 \ 1$

$i = 1 \ 2 \ 3 \ 4 \ 5 \ 6 \ 7$   
 $a = 1 \ 2 \ 3 \ 4 \ 3 \ 2 \ 1$

[4-52]

[4-53]