

Pattern Printing – 2

Lecture– 8

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Ques : Print the given pattern

```

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

→

```

_ _ _
_ _
_
_
    
```

+

```

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

Rhombus

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***Ques** : Print the given pattern

```

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

→

```

  _ _ _
 _ _
 _
  
```

+

```

1  *  → 1
2  * * *  → 3
3  * * * * *  → 5
4  * * * * * * *  → 7
  
```

$j=1$ to $2i-1$

Star Pyramid

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*Ques : Print the given pattern

```

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

```

```

1  _ _ _ _ +
2  _ _ _ + * *
3  _ _ + * * * *
4  _ * + * * * *
5  + * + * * * *

```

nst & nsp
 \downarrow \downarrow
 no. of no. of
 stars spaces
 \downarrow
 $i \rightarrow$ no. of lines

1) pehli line me 'n-1' spaces honge. & $nsp--;$

2) $nst = 1$, $nst += 2$

Star Pyramid

```
int nst = 1;
int nsp = n-1;
for(int i=1; i<=38; i++){
    // spaces
    for(int j=1; j<=nsp0; j++){
        cout<<" ";
    }
    nsp--;
    for(int k=1; k<=nst5; k++){
        cout<<"*";
    }
    nst+=2;
    cout<<endl;
}
```

n = 3

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

i = 1 2 3 4
nst = 1 3 5 7
nsp = 2 1 0 -1

Output

```
• _ _ *
• _ * * *
• * * * * *
•
```

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Ques : Print the given pattern

```

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

→

```

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

+

```

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

+

```

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

Number Pyramid Palindrome

i
 \downarrow
 1 1
 2 2 1
 3 3 2 1
 4 4 3 2 1
 5 5 4 3 2 1

1 _ _ _ 1
 2 _ _ 1 2 1
 3 _ 1 2 3 2 1
 4 1 2 3 4 3 2 1
~~5 1 2 3 4 5 4 3 2 1~~

$j = i ; j \geq 1 ; j--$

***Ques** : Print the given pattern

n sp & n st

```

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

$n = 4$

```

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

$n = 3$

```

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

$n = 2$

$n = 1$

$2n - 1$ lines print line

Star Diamond

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***Ques** : Print the given pattern

$n=4$

```

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

$nsp = n-1 \rightarrow 3 \rightarrow nsp-- / nsp++$
 $nst = 1 \quad nst += 2 / nst -= 2$
 ↓ ↓
 4th line 6th line

$i = 1$ to $i \leq 2*n-1$

Star Diamond

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```

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

```

n = 4

nst = 1 2 3 4 3 2 1

nsp = 3 2 1 0 1 2 3

i = 1 2 3 4 5 6 7 8

Output

```

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

```

```

• _ _ _ *
• _ _ * * *
• _ * * * *
• * * * * *
• _ * * * *
• _ _ * * *
• _ _ _ *
•

```

Ques : Print the given pattern

***** $\rightarrow 2n-1$ stars

$nsp = 1, nsp += 2$

```

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

\rightarrow

```

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

d

$m = 3$

$n, m = n - 1$

```

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

$m = 3$ $j = m + 1 - i$

***Ques** : Print the given pattern

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

1 2 3	—	5 6 7
1 2	+ — — —	+ 6 7
1	— — — — —	7

$$n = 4$$

$$m = n - 1 = 3$$

Number Bridge

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

Ultimate

```

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
    
```

$n = 1$

1

$n = 2$

```

2 2 2
2 1 2
2 1 2
    
```

$n = 3$

```

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

$n = 4$

$i = 1 \text{ to } 2 * n - 1$

Number SPIRAL

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

$n = 4$

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

\downarrow

$i \left[\begin{array}{c} n=4 \end{array} \right.$

each i, j cell has
a value $\min(i, j)$

Pseudo Variables

3 2 1 → b

1 2 3 4 5 6 7 → j

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

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

a
i

n = 4

2n-1 lines

$$i + a = 2n \rightarrow a = 2n - i$$

Final Changes

$$1 \rightarrow n-0$$

$$2 \rightarrow n-1$$

$$3 \rightarrow n-2$$

⋮

$$x \rightarrow n-x+1$$

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What's in the next lecture?

A head start to modern programming: Functions!

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