

DSA DA Y14 :- 31/07/24

:- Wednesday

\* prog 1 :

\* \* \*  
 \* \* \* \* \*  
 \* \* \* \* \* \* \*  
 \* \* \* \* \* \* \* \* \*  
 1 2 3 4 5 6 7 8 9

Output

$i = 1$   
 $i = 2$   
 $i = 3$   
 $i = 4$   
 $i = 5$

$j = 1 \dots 5 \dots$   
 $j = 2 \dots 4 \dots 6$   
 $j = 3 \dots 4 \dots 5 \dots 7$   
 $j = 2 \dots 3 \dots 4 \dots 5 \dots 6 \dots 8$   
 $j = 1 \dots 2 \dots 3 \dots 4 \dots 5 \dots 6 \dots 8 \dots 9$

space	star	space
$j < n - i$	$j =$	$j > n - i$

$i = 1$	$i = 2$	star
2	3	$i = 1$
3	5	
4	7	
5	9	0

$D(5) = 1 \quad 3 \quad 9$

```

for (int i = 1; i <= n; i++)
{
    for (int j = 1; j <= n - i; j++)
        cout << " ";
    {
        for (int j = 1; j <= 2 * i - 1; j++)
            cout << "*";
        }
    for (int j = 1; j <= n - i; j++)
        cout << " ";
    }
}

```

Program :-

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

↑ middle

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

```

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

int K = 1;

int middle = (2 \* i + 1) / 2;

// star

```
for (int j = 1; j <= 2 * i - 1; j++)
```

```
{ cout << " ";
```

```
if (j < middle)
```

```
{ K++;
```

```
(++i);
```

```
else
```

```
{ K--;
```

```
K--;
```

```
(++i);
```

```
}
```

// space

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

```
{ cout << " ";
```

```
cout << endl;
```

```
}
```

⇒ Dry Run :-

$n = 5$

$i = 1$

$j = 1$

~~$j <= 5 - 1 \Rightarrow 4$~~

~~print (" ")~~

~~$j = 5 - 2 = 3$~~

~~print (" ")~~

~~$j = 5 - 3 = 2 \Rightarrow \text{print (" ")}$~~

~~$j = 5 - 4 = 1 \Rightarrow \text{print (" ")}$~~

~~$i < 1 + 1 \Rightarrow 2 \text{ lines true}$~~

$$j <= 5 - 1 \Rightarrow 4$$

$$j <= 4$$

$$j <= 4$$

$$j <= 4$$

$$j <= 4$$

} print 0 " " )  
    4 space

$$K = 1$$

$$\text{middle} = (2 * i + 1) / 2 \Rightarrow 3 / 2 \\ \Rightarrow 1.5 \Rightarrow ①$$

for (int j = 1 ; j <= 2 + i - 1 ; j++)  
    j <= 1

print = ①

if (j <= 1) true

$$K = 2$$

for (j = 2 ; j <= 1) = false.

for (int j = 1 ; j <= 4 ; j++)

print 4 spaces.

Iteration 2

$$j <= 2 \Rightarrow j <= 5 - 2 = 3$$

print space 3 times

$$K = 1$$

$$\text{middle} = 2 * 2 + 1 / 2 \neq 5 / 2 = \underline{\underline{②}}$$

~~for(j=1; j<3; j++)~~

print k = 1

j < middle  $\Rightarrow$  i < 2

k++

print k = 2

j < middle  $\Rightarrow$  2 < 2 false

k = 1

print k = 1

Linee go on

$\Rightarrow$

prog 3 :-

\* \* \* \* \* \* \*  
\* \* \* \* \* \* \*  
\* \* \* \* \* \*  
\* \* \* \*  
\*

i = 1

1 2 3 4 5 6 7 8 9

i = 2

- 2 3 4 5 6 7 8 -

i = 3

- - 3 4 5 6 7 - -

i = 4

- - - 4 5 6 - - -

i = 5

- - - - 5 - - - -

$\frac{j}{i}$

$\frac{j}{k}$

star .

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i = 1  
i = 2  
i = 3  
i = 4  
i = 5

9  
7  
5  
3  
1

j <= ~~2 \* (n - i)~~ 2 \* (n - i) + 1

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

{  
    for (int j = 1; j < i; j++)

        cout << " ";

} {

    for (int j = 1; j <= 2 \* (n - i) + 1;  
            j++)

        cout << "\*" ;

}

    cout << endl;

}

⇒ prog 4 :- \*

\* \* \* \* \*  
\* \* \* \* \*  
\* \* \* \* \*  
\* \* \* \* \*  
\* \* \* \* \*  
\* \* \* \* \*  
\* \* \* \* \*  
\*

i = 1							15			
i = 2			4	5	6					
i = 3			3	4	5	6	7			
i = 4			2	3	4	5	6	7		
i = 5		1	2	3	4	5	6	7	8	
i = 6		1	2	3	4	5	6	7	8	9
i = 7		2	3	4	5	6	7	8	9	
i = 8		3	4	5	6	7				
i = 9		4	5	6	7					
i = 10						5				

```
for (int i=1; i<=n; i++)  
{    cout << " " << i  
    for (int j=1; j<=2*i-1; j++)  
    {        cout << " * " << j  
    }  
    cout << endl;  
}
```

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

```

for (int j = 1; j <= 2 * (n - i) + 1; j++)
{
    cout << "*";
}
cout << endl;
}

```

prog 5 :- \*

\* \* \*

\* \* \* \*

\* \* \* \*

\* \* \* \*

\* \* \*

\* \*

i = 1	1		{ } j <= i
i = 2	1 2	0	
i = 3	1 2 3	1	
i = 4	1 2 3 4	2	
i = 5	1 2 3 4 5	3	
i = 6	1 2 3 4	4	
i = 7	1 2 3	5	
i = 8	1 2	6	
i = 9	1	7	

(++i) is  $\Rightarrow$  run i in reverse  
order.

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

→ prog 6

1				
0	1			
1	0	1		
0	1	0	1	
1	0	1	0	1
0	1	0	1	0

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

```

if ( i % 2 == 0 & & j % 2 == 0)
{
    K = 1;
    cout << K << endl;
}

else if ( i % 2 == 0 & & j % 2 != 0)
{
    K = 1;
    cout << K << endl;
}

else
{
    K = 0;
    cout << K << endl;
}

```

if ( i & j odd  $\Rightarrow$  print 1  
 i & j even  $\Rightarrow$  print 0  
 else 0

→ prog :-

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

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

→ prog 8 :- A

A B C D

A B C D E

A B C D E

A B C D E

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

```
{ char k = 'A';
    for (int j = 1; j <= i; j++)
```

```
    cout << k << " ";
    k++;
}
```

```
cout << endl;
```

```
}
```

→ prog 9 :-

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

```
char k = 'A';
for (int i = 1; i <= n; i++)
{
    for (int j = 1; j <= i; j++)
        cout << k << " ";
    k++;
    cout << endl;
}
```

→ prog 10 :-

i=2	D	E			
i=3	C	D	E		
i=4	B	C	D	E	
i=5	A	B	C	D	E

$j \leq i$

```
char k = 'E' - i + 1;
i=1 ; K = (E) - 1 + 1 = E
i=2 ; K = (E) - 2 + 1 = D
i=3 ; K = (E) - 3 + 1 = C
i=4 ; K = (E) - 4 + 1 = B
i=5 ; K = (E) - 5 + 1 = A
```

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

{ char K = 'E' - i + 1;

for (int j=1; j <= i; j++)

cout << K << "j"

K++;

}

cout << endl;

}

→ prog11 :- D C  
D C B  
D C B A

char K = 'A' + n - 1

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

{ char K = 'A' + n - 1;

for (int j=1; j <= i; j++)

cout << K << "j"

K--;

}

cout << endl;

}

→ prog 12 :-

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

i = 1	1, 2, 3, 4, 5	$\Rightarrow j \leftarrow 5$
i = 2	1, 2, 3, 4	$\Rightarrow j \leftarrow 4$
i = 3	1, 2, 3	$\Rightarrow j \leftarrow 3$
i = 4	1, 2	$\Rightarrow j \leftarrow 2$
i = 5	1	$\Rightarrow j \leftarrow 1$

$$j \leftarrow n - i + 1$$

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

char k = 'A';

for (int j = 1; j <= n - i + 1; j++)

cout << k << "j"

k += j;

cout << endl;

}

→ prog 13 :-

A								
A	B	A						
A	B	C	B	A				
A	B	C	O	C	B	A		
A	B	C	O	E	P	E	B	A

i=1            - - - 4 5 - - -  
i=2            - - - 4 5 6 - - -  
i=3            - - - 3 4 5 6 7 - - -  
i=4            - 2 3 4 5 6 7 8 - - -  
i=5            1 2 3 4 5 6 7 8 9

ans.

1	2	3	4	5	6	7	8	9
2								
3								
4								
5								

~~2 3 4 5 6 7 8 9~~

$j = 12$   
 $2 * i - 1$

```
for (int i=1; i<=n; i++)  
{  
    for (int j=1; j<=2*i-1; j++)  
    {  
        cout << " ";  
    }  
    char k = A[j];  
    int middle = 2*i/2;  
    for (int j=1; j<=2*i-1; j++)  
    {  
        cout << k << " ";  
        if (j < middle)  
        {  
            k++;  
        }  
        else  
        {  
            k--;  
        }  
    }  
    cout << endl;  
}
```