

Pattern Printing - 3

①

*	$n=5$		
**		row	space
***		1	$5 - \text{row} = 4$
****		2	$5 - \text{row} = 3$
*****		3	$5 - 3 = 2$
		4	$5 - 4 = 1$
		5	$5 - 5 = 0$

① row = 1

② row <= 5

③ Print space $5 - \text{row}$ times

④ Print * row times

⑤ row = row + 1

```
for (row = 1; row <= n; row = row + 1)
```

```
{
```

```
    for (col = 1; col <= 5 - row; col = col + 1)
```

```
    {
```

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

```
    }
```

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

```
    {
```

```
        cout << "*";
```

```
    }
```

```
    cout << endl;
```

```
}
```

(11)

1

2 2

3 3 3

4 4 4 4

Space → number

	space	row	num - print
i) row = 1	4 - row = 3	1	1
ii) row ≤ n	4 - 2 = 2	2	2
iii) print space n - row times.	4 - 3 = 1	3	3
iv) print row, row times.	4 - 4 = 0	4	4
v) row = row + 1			

```
for(row = 1; row ≤ n; row = row + 1)
```

```
{
```

```
    for(col = 1; col ≤ n - row; col = col + 1)
```

```
    {
```

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

```
    }
```

```
    for(col = 1; col ≤ row; col = col + 1)
```

```
    {
```

```
        cout << row;
```

```
    }
```

```
    cout << endl;
```

```
}
```


(iii)

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

$n = \text{row} + \text{space}$

Num \leftarrow col: (1 \rightarrow row)

- (i) row = 1
- (ii) row <= n
- (iii) print space n - row times
- (iv) print 1 to row
- (v) row = row + 1

for (row = 1; row <= n; row = row + 1)

{

for (col = 1; col <= n - row; col = col + 1)

{

cout << " ";

}

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

{

cout << col << " ";

}

cout << endl;

}

iv

```

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

Space \rightarrow char
 $(n - \text{row})$ \downarrow \downarrow A to $(A + \text{row} - 1)$

- (i) row = 1
- (ii) row <= n
- (iii) print space n - row times
- (iv) print 'A' to 'A' + row - 1
- (v) row = row + 1

```
for (row = 1; row <= n; row = row + 1)
```

```
{
```

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

```
  {
```

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

```
  }
```

```
  for (col = 'A'; col = 'A' + row - 1; col = col + 1)
```

```
  {
```

```
    cout << col << " ";
```

```
  }
```

```
  cout << endl;
```

```
}
```


(v)

```

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

Space

(5-row)

number

row to 1

- (i) row = 1
- (ii) row <= n
- (iii) Print space n-row times
- (iv) Print row to 1
- (v) row = row + 1

```

for (row = 1; row <= n; row++)
    for (col = 1; col <= n - row; col++)
        cout << " ";
    }
    for (col = row; col >= 1; col--)
        cout << *col << " ";
    }
}
  
```