DSA

Patterns

Square Pattern

n = 4

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

we will be using the nested loops.

① Outer loops will run n times means it will count the number of lines.

② Inner loop will decide what to print in a single row.

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

Outer loop will remain same.

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

In general, loops

when i or j = 1 → 1 to n

when i or j = 0 → 0 to n-1 / <n

In characters

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

Outer loop will remain same

Inner loop

```
char ch = 'A';
for(j=0; j<n; j++){
    cout << ch
    ch++;
}
```

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

```
for(i=0; i<n; i++){
  for(j=1; j<i+1; j++)
    cout<<j;
```

Reverse Triangle

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

```
for (i=0 to i<n; i++){
for(j=i+1; j>0; j--){
  cout<<j;
```

Floyd's triangle

```
1        n=4
2 3
4 5 6
7 8 9 10
```

```
int num=1
for(i=0; i<n; i++){
for(j=0 to i+1){
  cout<<num;
  num++;
}
}
```

```
A
B C
D E F
G H I J
```

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

Inverted Triangle Pattern:-

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

n=4

space	num
0	4
1	3
2	2
3	1

AAAA
BBB
CC
D

```
for(i=0; i<n; i++){
for(j=0; j<i; j++){
  cout<<" ";
for(j=0; j<n-i; j++)
  cout<<(i+1)
```

out of outer loop

NUM = 1 — for no keeping it resetting

```
1,2,3   n=3     for(i=0; i<n; i++){
4,5,6           for(j=0; j<n; j++){
7,8,9             cout<<num;
                  num++
                }
              endl;
```

```
ABC
DEF  n=3
GHI
```

Triangle Pattern

```
0 *
1 * *        n=4
2 * * *
3 * * * *
```

```
0 1 (i+1)
1 2 2 (i+1)
2 3 3 3 (i+1)
3 4 4 4 4 (i+1)
```

```
for(i=0; i<n; i++){
for(j=0; j<i+1; j++){
    cout<<(i+1);
}
cout<<endl;
}
```

Outer loop 0 to n-1

```
for(i=0; i<n; i++){
```

Inner loop

(i+1) stars

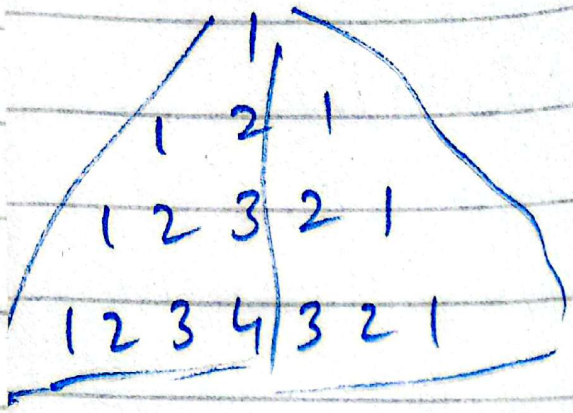
1 to i+1 (i+1)

0 to i (i+1)

```
for(int j=0; j<i+1; j++)
  cout<<"*";
endl; }
```

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

Pyramid



for (i=0; i<n; i++)
spaces

n-i-1

num

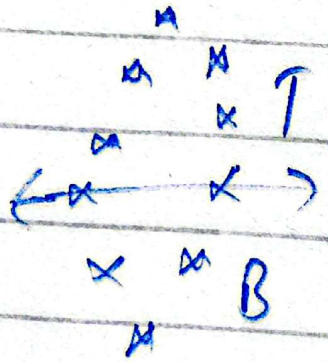
1 to i+1

num 2

j=0 to i

(i times)

Hollow Diamond Pattern



for(i=0; i<n; i++){
spaces (n-i-1)
cout<< "*"
spaces 2*i-1
if(i!=0){
cout<< "*";