Patterns - Nested loop

- Outer loop - no. of rows
- Inner loop - focus on columns & connect them somehow to rows.
- print the '*' inside the inner for loop.
- Observe symmetry (optional)

```
Void print1(int n){
  for(i=0; i=4; i++){
      for(j=0; j=4; j++){
          cout<<"*";
      }
      cout<< endl;
  }
}
```

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

(Online coding compiler)

```
int main(){
    int t; cin>>t;
  for(int i=0; i<t; i++)
  { int n;
    cin>>n;
    print1(n)
  }
```

- Pattern 2:

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

```
*
```

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

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

- Pattern 3:

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

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

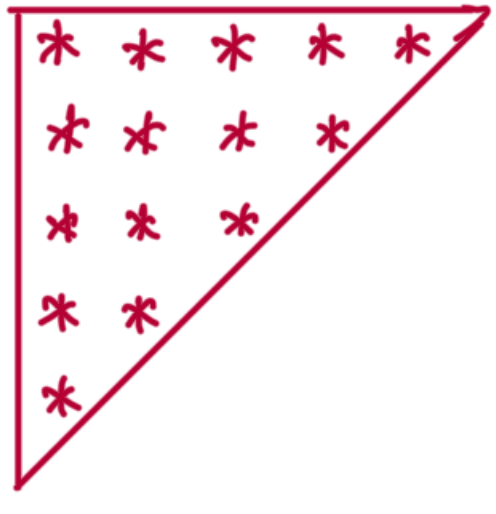
- Pattern 4:

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

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

Pattern 5:

```
for (int i=5; i>=1; i--){
   for (int j = i ; j <=i ; j++) {
        cout<<"* ";
   }
   cout << endl;
}
```



2nd method:

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

Pattern 6:

```
for (i=5; i>=1; i--){
    for (j=1; i<=i; i++){
        cout<< j;
    }
    cout << endl;
}
```

1st row : 5
2nd → 4
3rd → 3
4th → 2
5th → 1

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

Pattern 7:

```
for (int i= 1 ; i <= 4 ; i++){
    for (int j=1 ; j <= 4*2-1 ; j++){
        if (j=< 4-i || j >= 4+i)
            cout << "-";
        else
            cout<< "*";
    }
    cout << endl;
}
```

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

Pattern 8:

```
1 2 3 4 5 6 7
1→ * * * * * * *
2→ - * * * * * -
3→ - - * * * - -
4→ - - - * - - -
```

[0, 7, 0]
[1, 5, 1]
[2, 3, 2]
[3, 1, 3]

```
for (int i= 1 ; i <= 4 ; i++){
    for (int j=1 ; j <= 4*2-1 ; j++){
        if (j<=i-1 || j>4*2-i)
            cout << "-";
        else
            cout<< "*";
    }
    cout << endl;
```

space
2 → 1,7
3 → 2, 6, 7

Pattern 9: Combine pattern 7 & 8

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

(10)

(no two lines of same no. of lines)

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

4 → 2

5 → 1

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

(11)

```
0 → 1
1 → 0 1
2 → 1 0 1
3 → 0 1 0 1
4 → 1 0 1 0 1
```

```
int start = 1;
for (int i=0; i<n; i++){
    if (i%2==0) start=1;
    else start=0,
    for (int j=0; j<=i; j++){
        cout << start;
        start = 1-start;
    }
    cout << endl;
}
```