List of Topics Involved:

- System.out.print() vs println()
- Pattern programs
- Nested loops
- If else and nested loops to write complex patterns

System.out.print() vs println()

The following functions are available in Java to print anything to the console.

However, there is a tiny distinction between the two of them, namely
System.out.print(): print() retains the cursor in the same line after printing the argument, while
System.out.println(): println() It moves the cursor to the next line.

Simple example for print() and println() statements

Ex: class Demo

```
{
    public static void main(String[] args)
    {
       System.out.println("Welcome to pattern programs");

         // this print statement will be printed in a new line.
       System.out.print(" Hi ");

         // this print statement will be printed in the same line.
       System.out.print("Hello");
    }
}
```

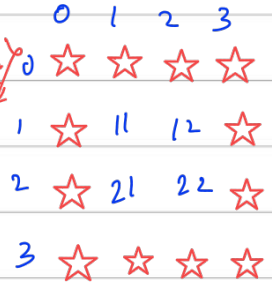
Output:
Welcome to pattern programs
Hi Hello

Nested Loop & Pattern Programming:-

Q) Print

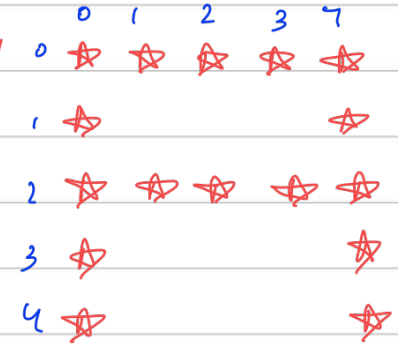
```
for (i=0; i<4; i++)
{
    for (j=0; j<4; j++)
    {
        Sop.print("*");
    }
    Sop.println();
}
```

Q)



```
int n=4;
for (int i=0, i<n, i++);
{
    for (int j=0; j<n; j++)
    {
        If (i==0 || j==0 || i==n-1 || j==n-1);
        {
            Sop ("*");
        }
        else
        {
            Sop (" ");
        }
    }
}
```

Q)

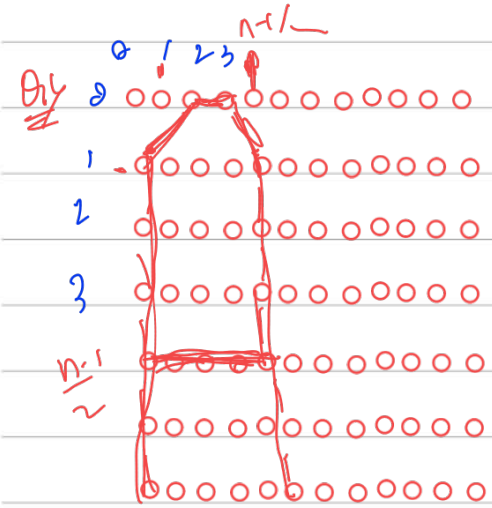


```
if (i==0 || j==0 || j==n-1 || i==(n-1)/2)
{
    Sop ("*")
}
else
{
    Sop (" ")
}
```

Ex

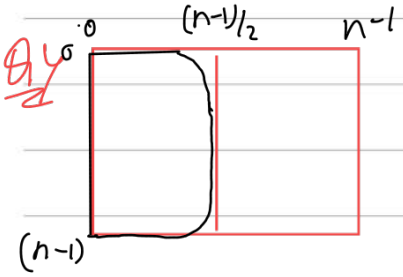
```
for (int i=0; i<n; i++)
{ If (i=0|| j==n-1|| i==(n-1)/2)}
```

Ex



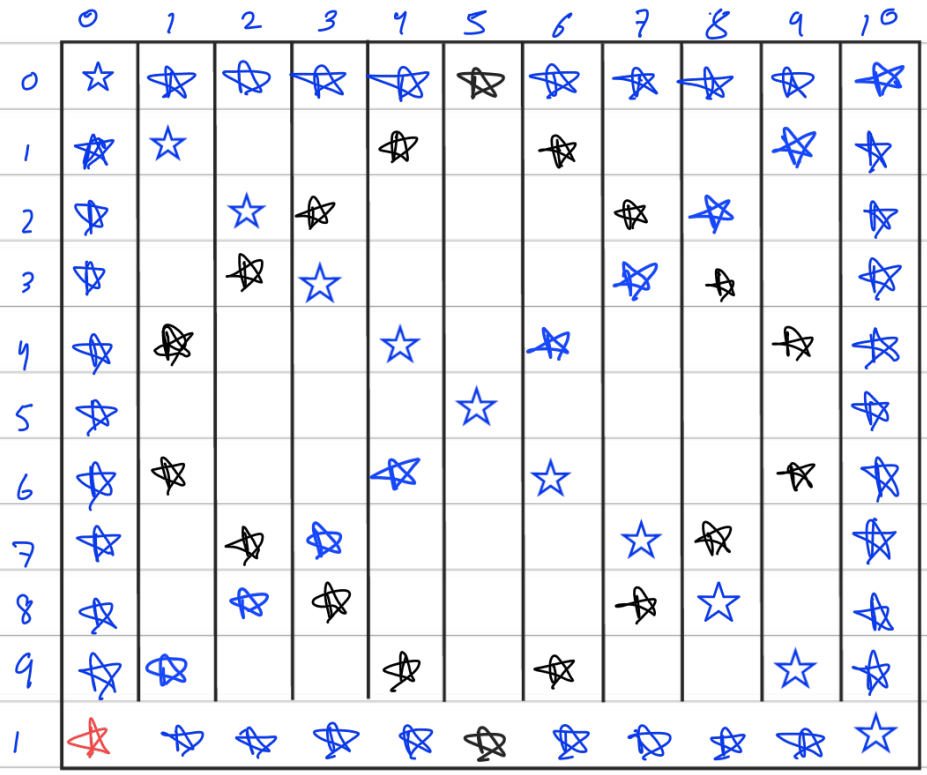

```
if(i==0 && j>0 && j<(n-1)/2 || j==0 && i>0|| i==(n-1)/2 && j<=(n-1)/2 || j==(n-1)/2 && i>0)
```

Ex



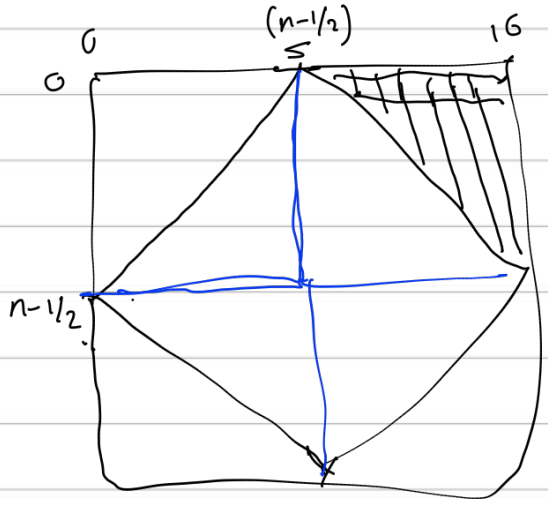

```
i==0 && j<(n-1)/2 ||
j==0
i==n-1 && j<(n-1)/2 ||
j==(n-1)/2 && i>0 && i<n-1
```

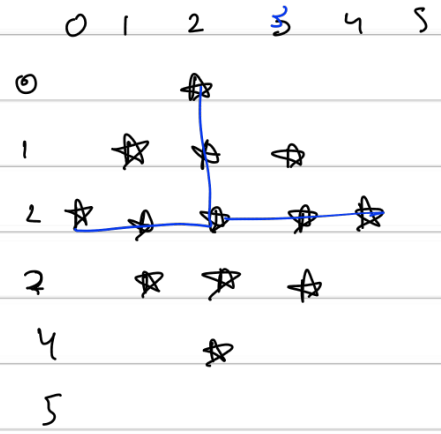
Complex Pattern Programming :-



S

$\frac{n-1}{2}$

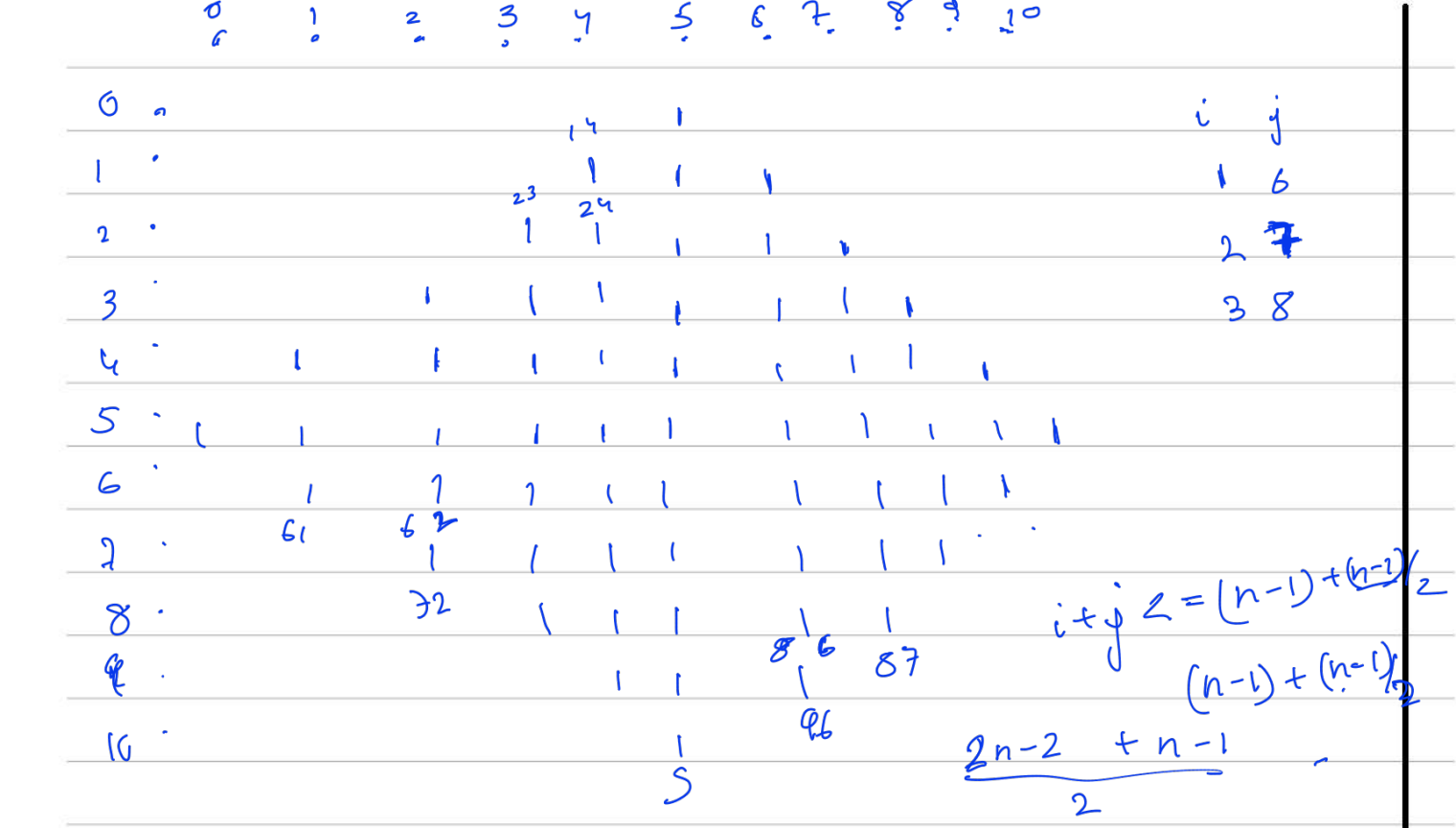




0 1 2 3 4 5

0
1
2
3
4
5

```
0 && j <= (n-1)/2
i = 1 && j == (n-1)/2 && i <= (n-1)/2
```



$i + j <= (n-1) + (n-1)/2$

$(n-1) + (n-1)/2$

$\frac{2n-2 + n-1}{2}$