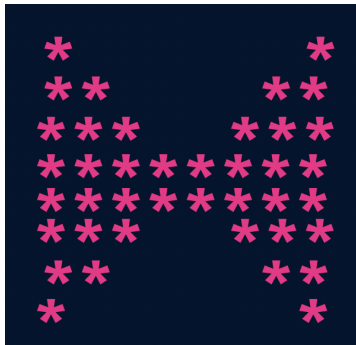# Java - Introduction to Programming
Lecture 6

Patterns - Part 2

1.


```java
import java.util.*;

public class Solutions {
    public static void main(String args[]) {
        int n = 4;

        //upper part
        for(int i=1; i<=n; i++) {
            for(int j=1; j<=i; j++) {
                System.out.print("*");
            }

            int spaces = 2 * (n-i);
            for(int j=1; j<=spaces; j++) {
                System.out.print(" ");
            }

            for(int j=1; j<=i; j++) {
                System.out.print("*");
            }
            System.out.println();
        }
```

```java
        //lower part
        for(int i=n; i>=1; i--) {
            for(int j=1; j<=i; j++) {
                System.out.print("*");
            }

            int spaces = 2 * (n-i);
            for(int j=1; j<=spaces; j++) {
                System.out.print(" ");
            }

            for(int j=1; j<=i; j++) {
                System.out.print("*");
            }
            System.out.println();
        }
    }
}
```
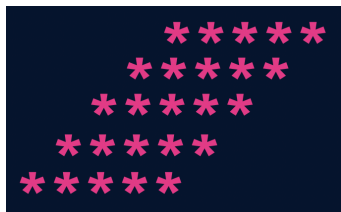
2.


```java
import java.util.*;

public class Solutions {
    public static void main(String args[]) {
        int n = 5;
```

```java
        for(int i=1; i<=n; i++) {
            //spaces
            for(int j=1; j<=n-i; j++) {
                System.out.print(" ");
            }

            //stars
            for(int j=1; j<=n; j++) {
                System.out.print("*");
            }
            System.out.println();
        }
    }
}
```

3.

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

```java
import java.util.*;

public class Solutions {
    public static void main(String args[]) {
        int n = 5;

        for(int i=1; i<=n; i++) {
            //spaces
            for(int j=1; j<=n-i; j++) {
                System.out.print(" ");
            }

            //numbers
            for(int j=1; j<=i; j++) {
                System.out.print(i+" ");
            }
            System.out.println();
        }
    }
}
```

4.

```
        1
       2 1 2
      3 2 1 2 3
     4 3 2 1 2 3 4
    5 4 3 2 1 2 3 4 5
```
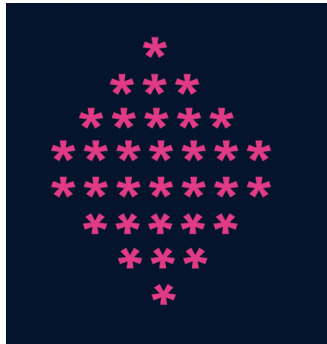
```java
import java.util.*;

public class Solutions {
    public static void main(String args[]) {
        int n = 5;
        for(int i=1; i<=n; i++) {
            //spaces
            for(int j=1; j<=n-i; j++) {
                System.out.print(" ");
            }

            //first part
            for(int j=i; j>=1; j--) {
                System.out.print(j);
            }

            //second part
            for(int j=2; j<=i; j++) {
                System.out.print(j);
            }
            System.out.println();
        }
    }
}
```

5.

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

```java
import java.util.*;

public class Solutions {
    public static void main(String args[]) {
        int n = 5;

        //upper part
        for(int i=1; i<=n; i++) {
            //spaces
            for(int j=1; j<=n-i; j++) {
                System.out.print(" ");
            }
            for(int j=1; j<=2*i-1; j++) {
                System.out.print("*");
            }
            System.out.println();
        }


        //lower part
        for(int i=n; i>=1; i--) {
            //spaces
            for(int j=1; j<=n-i; j++) {
                System.out.print(" ");
            }
            for(int j=1; j<=2*i-1; j++) {
                System.out.print("*");
            }
            System.out.println();
        }

    }
}
```

Homework Problems

1. **Print a hollow Butterfly.**

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

2. **Print a hollow Rhombus.**

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

3. **Print Pascal's Triangle.**

```
   1
  1 1
 1 2 1
1 3 3 1
1 4 6 4 1
```

4. **Print half Pyramid.**

```
1
```

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

5. **Print Inverted Half Pyramid.**

```
11111
222
33
4
```