Java Problem Statements Day 5

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Nested Loops:

1. Syntax for Nested for Loops

```
for (initialization; condition; increment/decrement) {
    for (initialization; condition; increment/decrement) {
        // Inner loop code
    }
    // Outer loop code
}
```

Example:

```
for (int i = 1; i <= 5; i++) {
    for (int j = 1; j <= 5; j++) {
        System.out.print("*");
    }
    System.out.println();
}
```

---

2. Syntax for Nested while Loops

```
while (condition) {
    while (condition) {
        // Inner loop code
    }
    // Outer loop code
}
```

Example:

```
int i = 1;
while (i <= 5) {
    int j = 1;
    while (j <= 5) {
        System.out.print("*");
        j++;
    }
    System.out.println();
    i++;}
```

---

3. Syntax for Nested do-while Loops

```
do {
    do {
        // Inner loop code
    } while (condition);
    // Outer loop code
} while (condition);
```

Example:

```
int i = 1;
do {
    int j = 1;
    do {
        System.out.print("*");
        j++;
    } while (j <= 5);
    System.out.println();
    i++;
} while (i <= 5);
```

Example Pattern Problem Statements:

Square Star Patter

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

CODE:

```
class Main {
    public static void main(String[] args) {
        for(int i=1;i<=5;i++){
            for(int j=1;j<=5;j++){
                System.out.print("* ");
            }
            System.out.println();
        }
    }
}
```

Increasing Triangle Star Pattern

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

CODE:

```
class Main {
    public static void main(String[] args) {
        for(int i=1;i<=5;i++){
            for(int j=1;j<=i ;j++){
                System.out.print("* ");
            }
            System.out.println();
        }
    }
}
```

Decreasing Triangle Star Pattern

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

CODE:-

```
class Main {
    public static void main(String[] args) {
        for(int i=1;i<=5;i++){
            for(int j=i;j<=5;j++){
                System.out.print("* ");
            }
            System.out.println();
        }
    }
}
```

Right Triangle Star Pattern

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

CODE:

```
class Main {
    public static void main(String[] args) {
        for(int i=1;i<=5;i++){
            for(int j=1;j<=i;j++){
                System.out.print("* ");
            }
            System.out.println();
        }
    }
}
```

Left Triangle Star Pattern/ Inverted

CODE:

```
class Main {
    public static void main(String[] args) {
        for (int i = 0; i < 5; i++) {
            for (int j = 0; j < i; j++) {
                System.out.print("  ");
            }
            for (int j = 0; j < 5 - i; j++) {
                System.out.print("* ");
            }
            System.out.println();
        }
    }
}
```

Hill Pattern Star Pattern/Pyramid Star Pattern or **Equilateral Triangle Star Pattern**

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

CODE:

```
class Main {
    public static void main(String[] args) {
        for(int i=1;i<=5;i++){
            for(int j=i;j<=5;j++){
                System.out.print(" ");
            }
              for(int j=1;j<=i;j++){
                System.out.print("* ");
            }
            System.out.println();
        }
    }
}
```

Reverse Hill star Pattern/ Inverted Pyramid Star Pattern or **Reverse Pyramid Star Pattern**.

CODE:

```
class Main {

    public static void main(String[] args) {

        for (int i = 1; i <= 6; i++) {

            for (int j = 1; j <=i; j++) {

                System.out.print(" ");

            }

            for (int j = 1; j <= 6 - i; j++) {

                System.out.print("* ");

            }

            System.out.println();

        }

    }

}
```

Diamond star Pattern/ Sandglass Star Pattern

CODE:

```
class Main {
    public static void main(String[] args) {
        int rows = 7;
        for (int i = 1; i <= rows; i++) {
            for (int j = 1; j <= rows - i; j++) {
                System.out.print(" ");
            }
            for (int j = 1; j <= 2 * i - 1; j++) {
                System.out.print("*");
            }
```

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

4. Syntax for Mixing for, while, and do-while

for Inside while:

```
while (condition) {
    for (initialization; condition; increment/decrement) {
        // Inner loop code
    }
    // Outer loop code
}
```

while Inside for:

```
for (initialization; condition; increment/decrement) {
    while (condition) {
        // Inner loop code
    }
    // Outer loop code
```

```
}
```

do-while Inside for:

```
for (initialization; condition; increment/decrement) {
   do {
      // Inner loop code
   } while (condition);
   // Outer loop code
}
```

for Inside do-while:

```
do {
   for (initialization; condition; increment/decrement) {
      // Inner loop code
   }
   // Outer loop code
} while (condition);
```

Examples:

---

1. for Inside while

Example: Printing a Right-Aligned Triangle of Numbers

```
public class ForInsideWhileExample {
   public static void main(String[] args) {
      int i = 1;
      while (i <= 5) {
         for (int j = 1; j <= i; j++) {
            System.out.print(j + " ");
         }
         System.out.println();
         i++;
      }
   }
}
```

Output:

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

---

2. while Inside for

Example: Printing a Pyramid of Stars

```
public class WhileInsideForExample {
    public static void main(String[] args) {
        for (int i = 1; i <= 5; i++) {
            int j = 1;
            while (j <= i) {
                System.out.print("*");
                j++;
            }
            System.out.println();
        }
    }
}
```

Output:

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

---

3. do-while Inside for

Example: Printing Squares of Numbers

```
public class DoWhileInsideForExample {
    public static void main(String[] args) {
        for (int i = 1; i <= 5; i++) {
            int j = 1;
            do {
                System.out.print(j * j + " ");
```

```
            j++;
        } while (j <= i);
        System.out.println();
    }
  }
}
```

Output:

```
1
1 4
1 4 9
1 4 9 16
1 4 9 16 25
```

---

4. for Inside do-while

Example: Printing a Multiplication Table

```
public class ForInsideDoWhileExample {
  public static void main(String[] args) {
    int i = 1;
    do {
      for (int j = 1; j <= 5; j++) {
        System.out.print(i * j + "\t");
      }
      System.out.println();
      i++;
    } while (i <= 5);
  }
}
```

Output:

```
1       2       3       4       5
2       4       6       8       10
3       6       9       12      15
4       8       12      16      20
5       10      15      20      25
```
