Assignment-3

Snippet 1:

```
public class InfiniteForLoop {
   public static void main(String[] args) {
      for (int i = 0; i < 10; i--) {
         System.out.println(i);
      }
   }
}
// Error to investigate: Why does this loop run infinitely? How should the loop control variable be adjusted?
```

Ans:-

Error – loop run infinitely.

- The loop starts with i = 0
- The condition i<10 is always true for any negative value.
- The update statement i-- decreases i on every iteration.
- Since i is always decreasing , it will never reach 10, causing an infinite loop.

```
//Corrected code-

public class InfiniteForLoop {
    public static void main(String[] args) {
        for (int i = 0; i < 10; i++) {
            System.out.println(i);
        }
    }
}
```

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac InfiniteForLoop.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java InfiniteForLoop.java
0
1
2
3
4
5
6
7
8
9

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

Snippet 2:

```
public class IncorrectWhileCondition {
   public static void main(String[] args) {
      int count = 5;
      while (count = 0) {
         System.out.println(count);
         count--;
      }
   }
}
// Error to investigate: Why does the loop not execute as expected? What is the issue with the condition in the
`while` loop?
```

Ans-

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac IncorrectWhileCondition.java
IncorrectWhileCondition.java:6: error: incompatible types: int cannot be converted to boolean
        while (count = 0) {
                     ^
1 error

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

- The condition uses = (assignment) instead of == (comparison).
- Count = 0 **assigns** 0 to count and always evaluates to false (since 0 is treated as false in Java).
- Since the condition is false at the start, the loop never executes.

```
//Corrected code-

public class IncorrectWhileCondition {
    public static void main(String[] args) {
        int count = 5;
        while (count > 0) {
            System.out.println(count);
            count--;
        }
    }
}
```

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac IncorrectWhileCondition.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java IncorrectWhileCondition.java
5
4
3
2
1

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

```java
//Snippet 3:

public class DoWhileIncorrectCondition {
    public static void main(String[] args) {
        int num = 0;
        do {
            System.out.println(num);
            num++;
        } while (num > 0);


    }
}
// Error to investigate: Why does the loop only execute once? What is wrong with the loop condition in the `do-while` loop?
```

Ans-
loop does not execute just once; it will keep going forever (an infinite loop) Since num++ in do block and while condition num > 0.

```java
//Corrected code:-

public class DoWhileIncorrectCondition {
    public static void main(String[] args) {
        int num = 0;
        do {
            System.out.println(num);
            num++;
        } while (num < 5);


    }
}
```

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac DoWhileIncorrectCondition.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java DoWhileIncorrectCondition.java
0
1
2
3
4

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

Snippet 4:

```
public class OffByOneErrorForLoop {
   public static void main(String[] args) {
      for (int i = 1; i <= 10; i++) {
         System.out.println(i);
      }
      // Expected: 10 iterations with numbers 1 to 10
      // Actual: Prints numbers 1 to 10, but the task expected only 1 to 9
   }
}
// Error to investigate: What is the issue with the loop boundaries? How should the loop be adjusted to meet the
expected output?
```

Ans-

- The loop starts at i= 1.
- The condition i <= 10 allows i to reach **10**.
- That produces **10 iterations**, printing numbers from **1 to 10**.
- However, the expected output is **only 1 to 9**. This is a classic “off-by-one” error—where the boundary condition includes an extra iteration.

```
//Corrected code-

public class OffByOneErrorForLoop {
    public static void main(String[] args) {
        for (int i = 1; i < 10; i++) {
            System.out.println(i);
        }
        // Expected: 10 iterations with numbers 1 to 10
        // Actual: Prints numbers 1 to 10, but the task expected only 1 to 9
    }
}
```

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac OffByOneErrorForLoop.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java OffByOneErrorForLoop.java
1
2
3
4
5
6
7
8
9

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

Snippet 5:

```
public class WrongInitializationForLoop {
   public static void main(String[] args) {
      for (int i = 10; i >= 0; i++) {
         System.out.println(i);
      }
   }
}
// Error to investigate: Why does this loop not print numbers in the expected order? What is the problem with the initialization and update statements in the `for` loop?
```

Ans-

- The loop **initializes** i to 10.
- The loop **condition** is i >= 0.
- The loop **update** statement is i++.
- With i++, the variable i **increases** on each iteration, meaning it quickly becomes 11, 12, 13, ... and **never** drops below 0. Consequently, i >= 0 is always true, resulting in an **infinite loop**

```
//Corrected code-

public class WrongInitializationForLoop {
    public static void main(String[] args) {
        for (int i = 10; i >= 0; i--) {
            System.out.println(i);
        }
    }
}
```

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac WrongInitializationForLoop.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java WrongInitializationForLoop.java
10
9
8
7
6
5
4
3
2
1
0

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

Snippet 6:

```
public class MisplacedForLoopBody {
   public static void main(String[] args) {
      for (int i = 0; i < 5; i++)
         System.out.println(i);
         System.out.println("Done");
   }
}
// Error to investigate: Why does "Done" print only once, outside the loop? How should the loop body be enclosed to include all statements within the loop?
```

Ans-

- Because there are **no curly braces** after the for, only System.out.println(i); is inside the loop.
- The line System.out.println("Done"); is **not** inside the loop; it executes **once** after the loop completes.

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac MisplacedForLoopBody.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java MisplacedForLoopBody.java
0
1
2
3
4
Done

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

```
//Corrected code-

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

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac MisplacedForLoopBody.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java MisplacedForLoopBody.java
0
Done
1
Done
2
Done
3
Done
4
Done

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

```
Snippet 7:

public class UninitializedWhileLoop {
    public static void main(String[] args) {
        int count;

        while (count < 10) {
            System.out.println(count);
            count++;
        }
    }
}
// Error to investigate: Why does this code produce a compilation error? What needs to be done
to initialize the loop variable properly?
```

Ans-

In Java, **local variables** (like `count` in your example) must be explicitly initialized **before** they are used.

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac UninitializedWhileLoop.java
UninitializedWhileLoop.java:7: error: variable count might not have been initialized
       while (count < 10) {
              ^
1 error

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

```
//Corrected code-

public class UninitializedWhileLoop {
    public static void main(String[] args) {
        int count=0;

        while (count < 10) {
            System.out.println(count);
            count++;
        }
    }
}
```

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac UninitializedWhileLoop.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java UninitializedWhileLoop.java
0
1
2
3
4
5
6
7
8
9
```

Snippet 8:

```
public class OffByOneDoWhileLoop {
   public static void main(String[] args) {
      int num = 1;
      do {
         System.out.println(num);
         num--;
      } while (num > 0);
   }
}
// Error to investigate: Why does this loop print unexpected numbers? What adjustments are needed to print the numbers from 1 to 5?
```

Ans-

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac OffByOneDoWhileLoop.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java OffByOneDoWhileLoop.java
1

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

```
//corrected code-

public class OffByOneDoWhileLoop {
    public static void main(String[] args) {
        int num = 1;
        do {
            System.out.println(num);
            num++;
        } while (num <= 5);
    }
}
```

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac OffByOneDoWhileLoop.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java OffByOneDoWhileLoop
1
2
3
4
5

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

Snippet 9:

```
public class InfiniteForLoopUpdate {
   public static void main(String[] args) {
      for (int i = 0; i < 5; i += 2) {
         System.out.println(i);
      }
   }
}
// Error to investigate: Why does the loop print unexpected results or run infinitely? How should the loop update expression be corrected?
```

Ans-

Expected: Loop should print numbers in sequence, likely 0, 1, 2, 3, 4.
Actual Output: 0, 2, 4 (every iteration skips an odd number).
Does it run infinitely? No, but it **doesn't print all values from 0 to 4** as one might expect.

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac InfiniteForLoopUpdate.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java InfiniteForLoopUpdate.java
0
2
4

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

```
//Corrected code-

public class InfiniteForLoopUpdate {
    public static void main(String[] args) {
        for (int i = 0; i < 5; i ++) {
            System.out.println(i);
        }
    }
}
```

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac InfiniteForLoopUpdate.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java InfiniteForLoopUpdate.java
0
1
2
3
4
```

Snippet 10:

```
public class IncorrectWhileLoopControl {
   public static void main(String[] args) {
      int num = 10;
      while (num = 10) {
         System.out.println(num);
         num--;
      }
   }
}
// Error to investigate: Why does the loop execute indefinitely? What is wrong with the loop condition?
```

Ans-
Error in code-
Assignment (=) instead of Comparison (==):

- The condition num = 10 is an assignment, not a comparison.
- In Java, assignment expressions do not return a boolean (true or false), which leads to a **compilation error**.

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac IncorrectWhileLoopControl.java
IncorrectWhileLoopControl.java:6: error: incompatible types: int cannot be converted to boolean
       while (num = 10) {
                  ^
1 error

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

```
//Corrected code-

public class IncorrectWhileLoopControl {
    public static void main(String[] args) {
        int num = 10;
        while (num == 10) {
            System.out.println(num);
            num--;
        }
    }
}
```

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>Javac IncorrectWhileLoopControl.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java IncorrectWhileLoopControl.java
10

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

Snippet 11:

```
public class IncorrectLoopUpdate {
   public static void main(String[] args) {
      int i = 0;
      while (i < 5) {
         System.out.println(i);
         i += 2; // Error: This may cause unexpected results in output
      }
   }
}
// Error to investigate: What will be the output of this loop? How should the loop variable be updated to achieve the desired result?
```

Ans:-

Error- Cause unexpected result in output

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac IncorrectLoopUpdate.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java IncorrectLoopUpdate.java
0
2
4

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

```
//Corrected code-
public class IncorrectLoopUpdate {
    public static void main(String[] args) {
        int i = 0;
        while (i < 5) {
            System.out.println(i);
            i += 1;         }
    }
}
```

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>java IncorrectLoopUpdate.java
0
1
2
3
4

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

Snippet 12:

```
public class LoopVariableScope {
   public static void main(String[] args) {
      for (int i = 0; i < 5; i++) {
         int x = i * 2;
      }
      System.out.println(x); // Error: 'x' is not accessible here
   }
}
// Error to investigate: Why does the variable 'x' cause a compilation error? How does scope
```

Ans-

Error - Compilation Error Occurs:

- After the loop finishes (or even outside the loop's braces), the variable x **no longer exists**.
- Attempting to reference x in System.out.println(x) **outside** the loop body causes a compilation error: cannot find symbol.

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac LoopVariableScope.java
LoopVariableScope.java:8: error: cannot find symbol
       System.out.println(x); // Error: 'x' is not accessible here
                          ^
  symbol:   variable x
  location: class LoopVariableScope
1 error

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

Variable Scope:

- The variable x is declared inside the **body** of the for loop.
- Its **scope** is limited to that block, meaning x can only be accessed **within** the curly braces of the for loop.

```
//Corrected code-

public class LoopVariableScope {
    public static void main(String[] args) {
        int x = 0; // Declare x outside the loop
        for (int i = 0; i < 5; i++) {
            x = i * 2; // Update x inside the loop
        }
        System.out.println(x); // Now x is accessible here
    }
}
```

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac LoopVariableScope.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java LoopVariableScope.java
8

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

SECTION 2: Guess the Output

Instructions:

1. **Perform a Dry Run:** Carefully trace the execution of each code snippet manually to determine the output.
2. **Write Down Your Observations:** Document each step of your dry run, including the values of variables at each stage of execution.
3. **Guess the Output:** Based on your dry run, provide the expected output of the code.
4. **Submit Your Assignment:** Provide your dry run steps along with the guessed output for each code snippet.

```
//Snippet 1:
public class NestedLoopOutput {
    public static void main(String[] args) {
        for (int i = 1; i <= 3; i++) {
            for (int j = 1; j <= 2; j++) {
                System.out.print(i + " " + j + " ");
            }
            System.out.println();


        }
    }
}
// Guess the output of this nested loop.
```

Ans-

```
output-
/*
i       j       sop
1       1       1 1 1 2
        2       2 1 2 2
2       1       3 1 3 2
        2
3       1
        2
*/
```

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac NestedLoopOutput.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java NestedLoopOutput.java
1 1 1 2
2 1 2 2
3 1 3 2

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

Snippet 2:

```
public class DecrementingLoop {
   public static void main(String[] args) {
      int total = 0;
      for (int i = 5; i > 0; i--) {
         total += i;
         if (i == 3) continue;
         total -= 1;
      }
      System.out.println(total);
   }
}
// Guess the output of this loop.
```

Ans-

```
Output-
/*
i   if   total       sop
5   f     0+5=5       -
4   f     5+4=9       -
3   T     9+3=12
          12-1=11    11

*/
```

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac DecrementingLoop.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java DecrementingLoop.java
11

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

Imp

Snippet 3:

```
public class WhileLoopBreak {
   public static void main(String[] args) {
      int count = 0;
      while (count < 5) {
         System.out.print(count + " ");
         count++;
         if (count == 3) break;
      }
      System.out.println(count);
   }
}
// Guess the output of this while loop.
```

Ans-

```
//Output-
/*
count while   sop   count++ if sop
0      T     0 1 2     1     f  -
1      T               2     f  -
2      T               3     T  3


output= 0 1 2 3


*/
```

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac WhileLoopBreak.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java WhileLoopBreak.java
0 1 2 3

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

Snippet 4:

```
public class DoWhileLoop {
   public static void main(String[] args) {
      int i = 1;
      do {
         System.out.print(i + " ");
         i++;
      } while (i < 5);
      System.out.println(i);
   }
}
// Guess the output of this do-while loop.
```

Ans-

```
/*
i      sop      i++   while   sop
1       1        2      T      -
2                3      T      -
3                4      T      -
4                5      f      5

Output- 1 2 3 4 5
*/
```

Now, outside the loop: System.out.println(i);

- Since i = 5, this prints 5 on the same line where the last print() statement left off.
- After printing 5, it **moves to the next line** because println() adds a newline at the end.

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac DoWhileLoop.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java DoWhileLoop.java
1 2 3 4 5

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

Snippet 5:

```
public class ConditionalLoopOutput {
   public static void main(String[] args) {
      int num = 1;
      for (int i = 1; i <= 4; i++) {
         if (i % 2 == 0) {
            num += i;
         } else {
            num -= i;
         }
      }
      System.out.println(num);
   }
}
// Guess the output of this loop.
```

Ans-

```
/*
i  if  num +=i  num -=i   sop
1   f    -        1-1=0    -
2   T    0+2=2      -      -
3   f    -        2-3=-1   -
4   T   -1+4=3      -      3

output= 3

*/
```

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac ConditionalLoopOutput.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java ConditionalLoopOutput
3

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

Snippet 6:

```
public class IncrementDecrement {
   public static void main(String[] args) {
      int x = 5;
      int y = ++x - x-- + --x + x++;
      System.out.println(y);
   }
}
// Guess the output of this code snippet.
```

Ans-

```
/*
int y = ++x - x-- + --x + x++;
        6   - 6   +   4 +  4   =8
              5             5

Output= 8
*/
```

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac IncrementDecrement.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java IncrementDecrement.java
8

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

Snippet 7:

```
public class NestedIncrement {
   public static void main(String[] args) {
      int a = 10;
      int b = 5;
      int result = ++a * b-- - --a + b++;
      System.out.println(result);
   }
}
// Guess the output of this code snippet.
```

Ans-

```
/*

int result = ++a * b-- - --a + b++;
              11 * 5    -  10 + 4    = 49
                   4            5

Output=49
*/
```

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>java NestedIncrement.java
49

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

```java
//Snippet 8:
public class LoopIncrement {
    public static void main(String[] args) {
        int count = 0;
        for (int i = 0; i < 4; i++) {
            count += i++ - ++i;
        }
        System.out.println(count);
    }


}
// Guess the output of this code snippet.
```

Ans-

```
/*
i  (count= count + i++ - ++i)          count    sop
0   T    =  0    + 0   -   2 = -2       -2       -
                   1
2   T    = -2    + 2   -   4 = -4       -4       -
                   3
4  f                                     -       -4

Output= -4

*/
```

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac LoopIncrement.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java LoopIncrement.java
-4

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

SECTION 3: Lamborghini Exercise:

Instructions:

1. **Complete Each Program:** Write a Java program for each of the tasks listed below.
2. **Test Your Code:** Make sure your code runs correctly and produces the expected output.
3. **Submit Your Solutions:** Provide the complete code for each task along with sample output.

Tasks:

1. Write a program to calculate the sum of the first 50 natural numbers.

Ans-

```
public class Sum{
        public static void main(String[] args){

        int sum=0;

        for(int i=1; i<=50; i++){
           sum += i;
        }
        System.out.println("Sum ="+ sum);


    }

}
```

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac Sum.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java Sum.java
Sum =1275

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

2. Write a program to compute the factorial of the number 10.

```
public class FactorialNumber{

   public static void main(String[] args){

        int fact= 1;

        for(int i=1; i<=10;i++){
           fact= fact * i;
        }
        System.out.println("Output ="+ fact);
   }

}

/*
Output = 3628800

*/
```

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac FactorialNumber.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java FactorialNumber.java
Output =3628800

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

3. Write a program to print all multiples of 7 between 1 and 100.

Ans-

```
public class Multiple{

  public static void main(String[] args){

    for(int i=1; i<=100;i++){
        if(i%7==0){
            System.out.println(i);
        }
     }

   }

}
```

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>java Multiple.java
7
14
21
28
35
42
49
56
63
70
77
84
91
98

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

4. Write a program to reverse the digits of the number 1234. The output should be 4321.

Ans-

```
public class ReverseNumber{

  public static void main(String[] args){

    int n = 1234;
    int temp = n;
    int rev = 0, rem;

    while(temp !=0){

        rem= temp%10;
        rev= rev * 10 + rem;
        temp= temp/10;

    }
    System.out.println("Reverse Number ="+rev);

  }

}
```

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac ReverseNumber.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java ReverseNumber.java
Reverse Number =4321

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

5. Write a program to print the Fibonacci sequence up to the number 21.

Ans-

```
public class FibonacciSequence{

  public static void main(String[] args){

        int n=21;
        int a=0, b=1, c;

        System.out.print("Fibonacci sequence up to 21: ");

        while (true) {
            c = a + b;
            if (c > 21) {
                break;
            }
            System.out.print(c + " ");

            // Shift the terms for the next iteration
            a = b;
            b = c;
        }

  }

}
```

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac FibonacciSequence.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java FibonacciSequence.java
Fibonacci sequence up to 21: 1 2 3 5 8 13 21
D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

6. Write a program to find and print the first 5 prime numbers.

```
public class First5Primes {
    public static void main(String[] args) {
        int count = 0;
        int number = 2;

        System.out.println("The first 5 prime numbers are:");

        // Keep searching until we find 5 primes
        while (count < 5) {
            if (isPrime(number)) {
                System.out.print(number + " ");
                count++;
            }
            number++;
        }
    }

    // Helper method to check if a number is prime
    public static boolean isPrime(int n) {
        if (n < 2) {
            return false;
        }
        // Check divisibility up to sqrt(n)
        for (int i = 2; i <= n-1; i++) {
            if (n % i == 0) {
                return false;
            }
        }
        return true;
    }
}
```

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac First5Primes.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java First5Primes.java
The first 5 prime numbers are:
2 3 5 7 11
D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

7. Write a program to calculate the sum of the digits of the number 9876. The output should be 30 (9 + 8 + 7 + 6).

Ans-

8. Write a program to count down from 10 to 0, printing each number.

```
public class Countdown {

    public static void main(String[] args) {

        for (int i = 10; i >= 0; i--) {

            System.out.println(i);

        }
    }
}
```

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac Countdown.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java Countdown.java
10
9
8
7
6
5
4
3
2
1
0

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

9. Write a program to find and print the largest digit in the number 4825.

```java
public class LargestDigit {
    public static void main(String[] args) {
        int n = 4825;
        int largest = 0;

        while (n != 0) {
            int digit = n % 10; // Extract the last digit
            if (digit > largest) {
                largest = digit;
            }
            n = n / 10;         // Remove the last digit
        }

        System.out.println("The largest digit is: " + largest);
    }
}
```

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac LargestDigit.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java LargestDigit.java
The largest digit is: 8

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

10. Write a program to print all even numbers between 1 and 50.

```java
public class EvenNumber{

  public static void main(String[] args){

        System.out.println("Even Number =");

        for(int i=1; i<=50; i++){
            if(i%2==0){
                System.out.print(i + " ");
            }
        }

  }

}
```

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac EvenNumber.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java EvenNumber.java
Even Number =
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50
D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

11. Write a Java program to demonstrate the use of both pre-increment and post-decrement operators in a single expression

Ans-

```
public class PreIncrementPostDecrement {
    public static void main(String[] args) {
        int a = 5;
        int b = 10;

        int result = ++a + b--;

        System.out.println("Value of a after ++a: " + a);        // 6
        System.out.println("Value of b after b--: " + b);        // 9
        System.out.println("Result of ++a + b--: " + result);    // 16
    }
}
```

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac PreIncrementPostDecrement.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java PreIncrementPostDecrement.java
Value of a after ++a: 6
Value of b after b--: 9
Result of ++a + b--: 16

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

12. Write a program to draw the following pattern:

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

Ans-

```
public class Pattern1{

  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();
    }

  }

}
```

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac Pattern1.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java Pattern1.java
*****
*****
*****
*****
*****

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

13. Write a program to print the following pattern:

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

Ans-

```
public class Pattern2 {
    public static void main(String[] args) {

        // 1) Print from 1 up to 5
        for (int i = 1; i <= 5; i++) {
            for (int j = 1; j <= i; j++) {
                System.out.print(i);
                if (j < i) {
                   System.out.print("*");
                }
           }
           System.out.println(); // move to next line

        }

        // 2) Print from 5 down to 1
        for (int i = 5; i >= 1; i--) {
            for (int j = 1; j <= i; j++) {
                System.out.print(i);
            if (j < i) {
                System.out.print("*");
            }
        }
        System.out.println(); // move to next line

        }
     }

   }
```

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac Pattern2.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java Pattern2.java
1
2*2
3*3*3
4*4*4*4
5*5*5*5*5
5*5*5*5*5
4*4*4*4
3*3*3
2*2
1

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

14. Write a program to print the following pattern:

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

Ans-

```
public class Pattern3{

  public static void main(String[] args){

    for(int i=0; i<=5;i++){
        for(int j=1; j<=i+1; j++){
            System.out.print("*");
        }
        System.out.println();
    }

  }

}
```

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac Pattern3.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java Pattern3.java
*
**
***
****
*****
******

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

15. Write a program to print the following pattern:

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

Ans-

5

16. Write a program to print the following pattern:

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

Ans-

```
public class Pattern4{

  public static void main(String[] args){

        int n=5;

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

             //for first half stars
            for(int k=1; k<=i; k++){
                System.out.print("*");
            }

             //for space
            for(int l=1; l<=i-1; l++){
                System.out.print("*");
            }
            System.out.println();

        }

  }

}
```

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac Pattern4.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java Pattern4.java
    *
   ***
  *****
 *******
*********

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

17. Write a program to print the following pattern:

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

18. Write a program to print the following pattern:

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

Ans-

```
public class Pattern7{

  public static void main(String[] args){

        int n=5;

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

             //for first half stars
            for(int k=1; k<=i; k++){
                System.out.print("*");
            }

             //for space
            for(int l=1; l<=i-1; l++){
                System.out.print("*");
            }
            System.out.println();

        }

        //for second half
        for(int i=n-1; i>=1; i--){

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

             //for first half stars
            for(int k=1; k<=i; k++){
                System.out.print("*");
            }

             //for space
            for(int l=1; l<=i-1; l++){
                System.out.print("*");
            }
            System.out.println();

        }

  }

}
```

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac Pattern7.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java Pattern7.java
    *
   ***
  *****
 *******
*********
 *******
  *****
   ***
    *

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

19. Write a program to print the following pattern:

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

Ans-

```
public class Pattern8 {
    public static void main(String[] args) {
        |
        for (int i = 1; i <= 5; i++) {

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

            System.out.println();
        }
    }
}
```

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac Pattern8.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java Pattern8.java
1
1*2
1*2*3
1*2*3*4
1*2*3*4*5

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

20. Write a program to print the following pattern:

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

Ans-

```
public class Paatern9 {
    public static void main(String[] args) {

        for (int i = 1; i <= 5; i++) {

            for (int j = 5; j >= 6 - i; j--) {
                System.out.print(j);

                if (j > 6 - i) {
                    System.out.print("*");
                }
            }

            System.out.println();
        }
    }
}
```

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac Paatern9.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java Paatern9.java
5
5*4
5*4*3
5*4*3*2
5*4*3*2*1

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

21. Write a program to print the following pattern:

```
1
1*3
1*3*5
1*3*5*7
1*3*5*7*9
```

Ans-

```
public class Pattern10 {
    public static void main(String[] args) {
        int rows = 5;

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

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

                System.out.print(2 * j - 1);

                if (j < i) {
                    System.out.print("*");
                }
            }

            System.out.println();
        }
    }
}
```

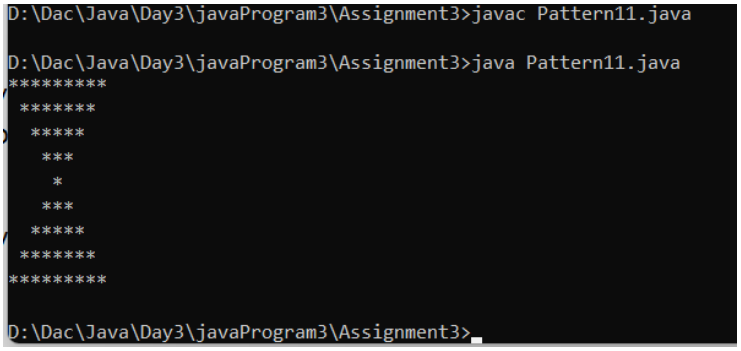
```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac Pattern10.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java Pattern10.java
1
1*3
1*3*5
1*3*5*7
1*3*5*7*9

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

22. Write a program to print the following pattern:

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

Ans-

```
public class Pattern11{

  public static void main(String[] args){

        int n=5;

        //for second half
        for(int i=n; i>=1; i--){

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

             //for first half stars
            for(int k=1; k<=i; k++){
                System.out.print("*");
            }

             //for space
            for(int l=1; l<=i-1; l++){
                System.out.print("*");
            }
            System.out.println();

        }

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

             //for first half stars
            for(int k=1; k<=i; k++){
                System.out.print("*");
            }

             //for space
            for(int l=1; l<=i-1; l++){
                System.out.print("*");
            }
            System.out.println();

        }


  }

}
```


D:\Dac\Java\Day3\javaProgram3\Assignment3>javac Pattern11.java
D:\Dac\Java\Day3\javaProgram3\Assignment3>java Pattern11.java
****
 ****
  *****
   ***
    *
   ***
  *****
 ****
****
D:\Dac\Java\Day3\javaProgram3\Assignment3>

23. Write a program to print the following pattern:

```
11111
22222
33333
44444
55555
```

Ans-

```
public class Pattern12 {
    public static void main(String[] args) {

        for (int i = 1; i <= 5; i++) {

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

            System.out.println();
        }
    }
}
```

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac Pattern12.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java Pattern12.java
11111
22222
33333
44444
55555

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

24. Write a program to print the following pattern:

```
1
22
333
4444
55555
```

Ans-

```
public class Pattern13 {
    public static void main(String[] args) {

        for (int i = 1; i <= 5; i++) {

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

            System.out.println();
        }
    }
}
```

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac Pattern13.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java Pattern13.java
1
22
333
4444
55555

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

25. Write a program to print the following pattern:

```
1
12
123
1234
12345
```

Ans-

```
public class Pattern14 {
    public static void main(String[] args) {

        for (int i = 1; i <= 5; i++) {

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

            System.out.println();
        }
    }
}
```

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac Pattern14.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java Pattern14.java
1
12
123
1234
12345

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```

26. Write a program to print the following pattern:

```
1
2 3
4 5 6
7 8 9 10
11 12 13 14 15
```

Ans-

```
public class Pattern15 {
    public static void main(String[] args) {
        int num = 1;

        for (int i = 1; i <= 5; i++) {

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

```
D:\Dac\Java\Day3\javaProgram3\Assignment3>javac Pattern15.java

D:\Dac\Java\Day3\javaProgram3\Assignment3>java Pattern15.java
1
2 3
4 5 6
7 8 9 10
11 12 13 14 15

D:\Dac\Java\Day3\javaProgram3\Assignment3>
```