OBJECT ORIENTED PROGRAMMING USING JAVA

ROLL NO: **230701123**

1. Write a Java Program to print a message using Class.

```
public class MessagePrinter {
    public void printMessage() {
        System.out.println("Hello World!");
    }

    public static void main(String[] args) {
        MessagePrinter printer = new MessagePrinter();
        printer.printMessage();
    }
}
```

```
D:\230701123>java  MessagePrinter
Hello World!
```

2. Write a basic Java Program to create a Class and Objects.

```java
public class Person {
    private String name;
    private int age;
    public Person(String name, int age) {
        this.name = name;
        this.age = age;
    }
    public void displayInfo() {
        System.out.println("Name: " + name);
        System.out.println("Age: " + age);
    }
    public static void main(String[] args) {
        Person person1 = new Person("Alice", 30);
        Person person2 = new Person("Bob", 25);
        person1.displayInfo();
        System.out.println(); // Print a blank line for separation
        person2.displayInfo();
    }
}
```

```
D:\230701123>java Person
Name: Alice
Age: 30

Name: Bob
Age: 25
```

3. Write a java program to find the area and perimeter of a circle.

```java
public class Circle {
    private double radius;
    public Circle(double radius) {
        this.radius = radius;
    }
    public double calculateArea() {
        return Math.PI * radius * radius;
    }
    public double calculatePerimeter() {
        return 2 * Math.PI * radius;
    }
    public static void main(String[] args) {
        Circle myCircle = new Circle(5.0); // Example radius
        double area = myCircle.calculateArea();
        System.out.println("Area of the circle: " + area);
        double perimeter = myCircle.calculatePerimeter();
        System.out.println("Perimeter of the circle: " + perimeter);
    }
}
```

```
D:\230701123>java circle
Area of the circle: 78.53981633974483
Perimeter of the circle: 31.41592653589793
```

4. Write a java program to swap two numbers with and without using temporary variable.

```java
public class SwapNumbers {
    public static void main(String[] args) {
        int a = 10;
        int b = 20;
        System.out.println("Before swapping:");
        System.out.println("a = " + a);
        System.out.println("b = " + b);
        int temp = a;
        a = b;
        b = temp;
        System.out.println("After swapping:");
        System.out.println("a = " + a);
        System.out.println("b = " + b);
    }
}
```

```
D:\230701123>java SwapNumbers
Before swapping:
a = 10
b = 20
After swapping:
a = 20
b = 10
```

5. Write a java program to find largest among 3 numbers.

```java
import java.util.Scanner;
public class LargestNumber {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter the first number: ");
        int num1 = scanner.nextInt();
        System.out.print("Enter the second number: ");
        int num2 = scanner.nextInt();
        System.out.print("Enter the third number: ");
        int num3 = scanner.nextInt();
        scanner.close();
        int largest;
        if (num1 >= num2 && num1 >= num3) {
            largest = num1;
        } else if (num2 >= num1 && num2 >= num3) {
            largest = num2;
        } else {
            largest = num3;
        }
        System.out.println("The largest number is: " + largest);
    }
}
```

```
D:\230701123>java LargestNumber
Enter the first number: 2
Enter the second number: 8
Enter the third number: 4
The largest number is: 8
```

6. Write a java program to count the total number of digits.

```java
import java.util.Scanner;

public class CountDigits {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter an integer: ");
        String input = scanner.nextLine();
        scanner.close();
        input = input.trim();
        if (input.matches("-?\\d+")) {
            int digitCount = input.length();
            System.out.println("The total number of digits is: " + digitCount);
        } else {
            System.out.println("Invalid input. Please enter a valid integer.");
        }
    }
}
```

```
D:\230701123>java CountDigits
Enter an integer: 5
The total number of digits is: 1

D:\230701123>
```

7. Write a java program to check leap year or not.

```
import java.io.*;
public class leap {
        public static void isLeapYear(int year)
        {
         boolean is_leap_year = false;
             if (year % 4 == 0) {
                        is_leap_year = true;
                        if (year % 100 == 0) {

                                if (year % 400 == 0)
                                        is_leap_year = true;
                                else
                                        is_leap_year = false;
                        }
                }



                else

                        // Flag dealing- Non leap-year
                        is_leap_year = false;

                if (!is_leap_year)
                        System.out.println(year + " : Non Leap-year");
                else
                        System.out.println(year + " : Leap-year");
        }

        public static void main(String[] args)
        {

                isLeapYear(2000);
                isLeapYear(2002);
        }
}
```

```
2000 : Leap-year
2002 : Non Leap-year
```

8. Write a java program to calculate the Simple Interest. 9. Write a java program to check whether the given number.

```java
import java.util.Scanner;
public class SimpleInterestCalculator {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter the principal amount (P): ");
        double principal = scanner.nextDouble();
        System.out.print("Enter the annual interest rate (R) in percentage: ");
        double rate = scanner.nextDouble();
        System.out.print("Enter the time in years (T): ");
        double time = scanner.nextDouble();
        scanner.close();
        double simpleInterest = (principal * rate * time) / 100;
        System.out.printf("The Simple Interest is: %.2f\n", simpleInterest);
    }
}
```

```
D:\230701123>java SimpleInterestCalculator
Enter the principal amount (P): 123
Enter the annual interest rate (R) in percentage: 4738
Enter the time in years (T): 6
The Simple Interest is: 34966.44
```

9. Write a java program to check whether the given number is even or odd.

```java
import java.util.Scanner;
public class EvenOddChecker {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter an integer: ");
        int number = scanner.nextInt();
        scanner.close();
        if (number % 2 == 0) {
            System.out.println(number + " is an even number.");
        } else {
            System.out.println(number + " is an odd number.");
        }
    }
}
```

```
D:\230701123>java EvenOddChecker
Enter an integer: 7
7 is an odd number.
```

10. Write a java program to add 2 complex numbers.

```
class ComplexNumber {
    private double real;
    private double imaginary;
    public ComplexNumber(double real, double imaginary) {
        this.real = real;
        this.imaginary = imaginary;
    }
    public ComplexNumber add(ComplexNumber other) {
        double realPart = this.real + other.real;
        double imaginaryPart = this.imaginary + other.imaginary;
        return new ComplexNumber(realPart, imaginaryPart);
    }
    public void display() {
        if (imaginary >= 0) {
            System.out.println(real + " + " + imaginary + "i");
        } else {
            System.out.println(real + " - " + Math.abs(imaginary) + "i");
        }
    }
}

public class ComplexNumberAddition {

    public static void main(String[] args) {
        ComplexNumber c1 = new ComplexNumber(3.5, 2.5); // Example complex number 3.5 + 2.5i
        ComplexNumber c2 = new ComplexNumber(1.5, 4.5); // Example complex number 1.5 + 4.5i
        ComplexNumber sum = c1.add(c2);
        System.out.print("Sum of ");
        c1.display();
        System.out.print("and ");
        c2.display();
        System.out.print("is ");
        sum.display();
    }
}
```

```
D:\230701123> java ComplexNumberAddition
Sum of 3.5 + 2.5i
and 1.5 + 4.5i
is 5.0 + 7.0i
```