DATASTRUCTURES AND ALGORITHMS

LAB 01 EC 4070

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2021E075

LAB 1

SEMESTER 4

EC4070

Q1.

```
import java.util.Scanner;

public class Calculator {
   private double num1;
   private double num2;
   private double sum;

   public Calculator() {
      num1 = 0;
      num2 = 0;
      sum = 0;
   }

   public void addition() {
      sum = num1 + num2;
   }

   public void subtraction() {
      sum = num1 - num2;
   }

   public void multiplication() {
      sum = num1 * num2;
   }

   public void division() {
         sum = num1 / num2;
   }

   public static void main(String[] args) {
      Scanner scanner = new Scanner(System.in);
      Calculator calculator = new Calculator();

      System.out.print("Enter your first number : ");
```

```
        calculator.num1 = scanner.nextDouble();

        System.out.print("Enter your second number : ");
        calculator.num2 = scanner.nextDouble();

        System.out.print("Enter the op (+, -, *, /) : ");
        char op = scanner.next().charAt(0);

        switch (op) {
            case '+':
                calculator.addition();
                break;
            case '-':
                calculator.subtraction();
                break;
            case '*':
                calculator.multiplication();
                break;
            case '/':
                calculator.division();
                break;
            default:
                System.out.println("Invalid op");
                break;
        }

        System.out.println("sum: " + calculator.sum);

        scanner.close();
    }
}
```

Calculator.java | main.java

```java
import java.util.Scanner;

public class Calculator {
    private double num1;
    private double num2;
    private double sum;

    public Calculator() {
        num1 = 0;
        num2 = 0;
        sum = 0;
    }

    public void addition() {
        sum = num1 + num2;
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    public void subtraction() {
        sum = num1 - num2;
    }

    public void multiplication() {
        sum = num1 * num2;
    }

    public void division() {
        sum = num1 / num2;
    }

    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        Calculator calculator = new Calculator();

        System.out.print("Enter your first number : ");
        calculator.num1 = scanner.nextDouble();

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        char op = scanner.next().charAt(0);

        switch (op) {
            case '+':
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                break;
            case '-':
                calculator.subtraction();
                break;
            case '*':
                calculator.multiplication();
                break;
            case '/':
                calculator.division();
                break;
            default:
                System.out.println("Invalid op");
                break;
        }

        System.out.println("sum: " + calculator.sum);

        scanner.close();
    }
}
```

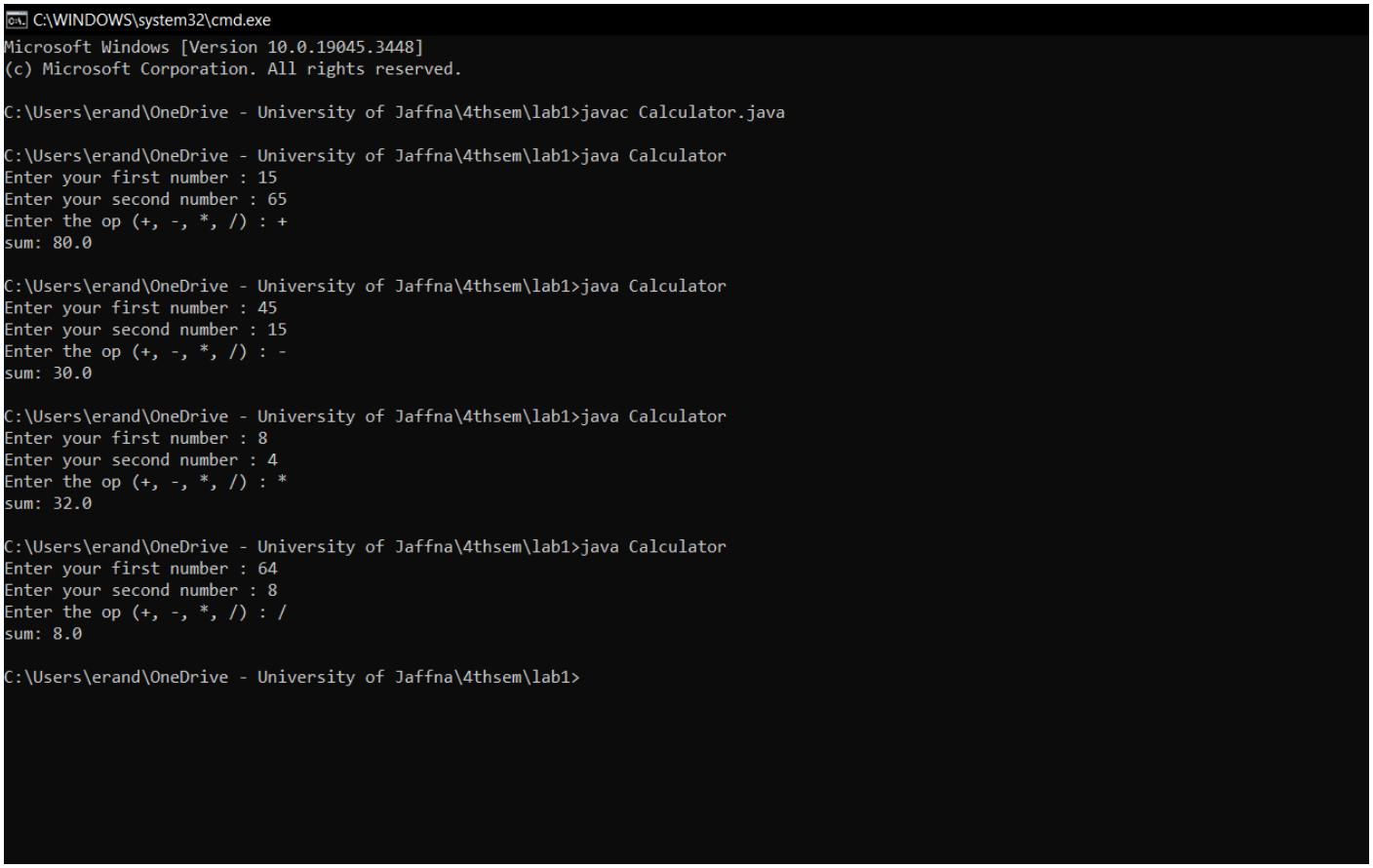

Q2.

```
abstract class Shape {
   abstract double calculateArea();
   abstract double calculatePerimeter();
}

class Circle extends Shape {
   private double radius;

   public Circle(double radius) {
      this.radius = radius;
   }

   double calculateArea() {
      return Math.PI*radius*radius;
   }

   double calculatePerimeter() {
      return 2*Math.PI*radius;
```

```
    }
}

class Triangle extends Shape {
    private double s1, s2, s3;

    public Triangle(double s1, double s2, double s3) {
        this.s1 = s1;
        this.s2 = s2;
        this.s3 = s3;
    }

    double calculateArea() {
        double s = (s1 + s2 + s3) / 2;
        return Math.sqrt(s * (s - s1) * (s - s2) * (s - s3));
    }

    double calculatePerimeter() {
        return s1 + s2 + s3;
    }
}

class Rectangle extends Shape {
    private double length, width;

    public Rectangle(double length, double width) {
        this.length = length;
        this.width = width;
    }

   double calculateArea() {
      return length * width;
   }

   double calculatePerimeter() {
```

```
        return 2 * (length + width);
    }
}

public class Main {
    public static void main(String[] args) {
        Circle circle = new Circle(7);
        System.out.println("Circle Of Area: " + circle.calculateArea());
        System.out.println("Circle Of Perimeter: " + circle.calculatePerimeter());

        Triangle triangle = new Triangle(5,6,7);
        System.out.println("Triangle Of Area: " + triangle.calculateArea());
        System.out.println("Triangle Of Perimeter: " + triangle.calculatePerimeter());

        Rectangle rectangle = new Rectangle(2,3);
        System.out.println("Rectangle Of Area: " + rectangle.calculateArea());
        System.out.println("Rectangle Of Perimeter: " + rectangle.calculatePerimeter());
    }
}
```

```java
abstract class Shape {
    abstract double calculateArea();
    abstract double calculatePerimeter();
}

class Circle extends Shape {
    private double radius;

    public Circle(double radius) {
        this.radius = radius;
    }

    double calculateArea() {
        return Math.PI*radius*radius;
    }

    double calculatePerimeter() {
        return 2*Math.PI*radius;
    }
}

class Triangle extends Shape {
    private double s1, s2, s3;

    public Triangle(double s1, double s2, double s3) {
        this.s1 = s1;
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        this.s3 = s3;
    }

    double calculateArea() {
        double s = (s1 + s2 + s3) / 2;
        return Math.sqrt(s * (s - s1) * (s - s2) * (s - s3));
    }

    double calculatePerimeter() {
        return s1 + s2 + s3;
    }
}

class Rectangle extends Shape {
    private double length, width;

    public Rectangle(double length, double width) {
        this.length = length;
        this.width = width;
    }

   double calculateArea() {
       return length * width;
   }

   double calculatePerimeter() {
       return 2 * (length + width);
   }
}

public class Main {
    public static void main(String[] args) {
        Circle circle = new Circle(7);
        System.out.println("Circle Of Area: " + circle.calculateArea());
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        Triangle triangle = new Triangle(5,6,7);
        System.out.println("Triangle Of Area: " + triangle.calculateArea());
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        Rectangle rectangle = new Rectangle(2,3);
        System.out.println("Rectangle Of Area: " + rectangle.calculateArea());
        System.out.println("Rectangle Of Perimeter: " + rectangle.calculatePerimeter());
    }
}
```

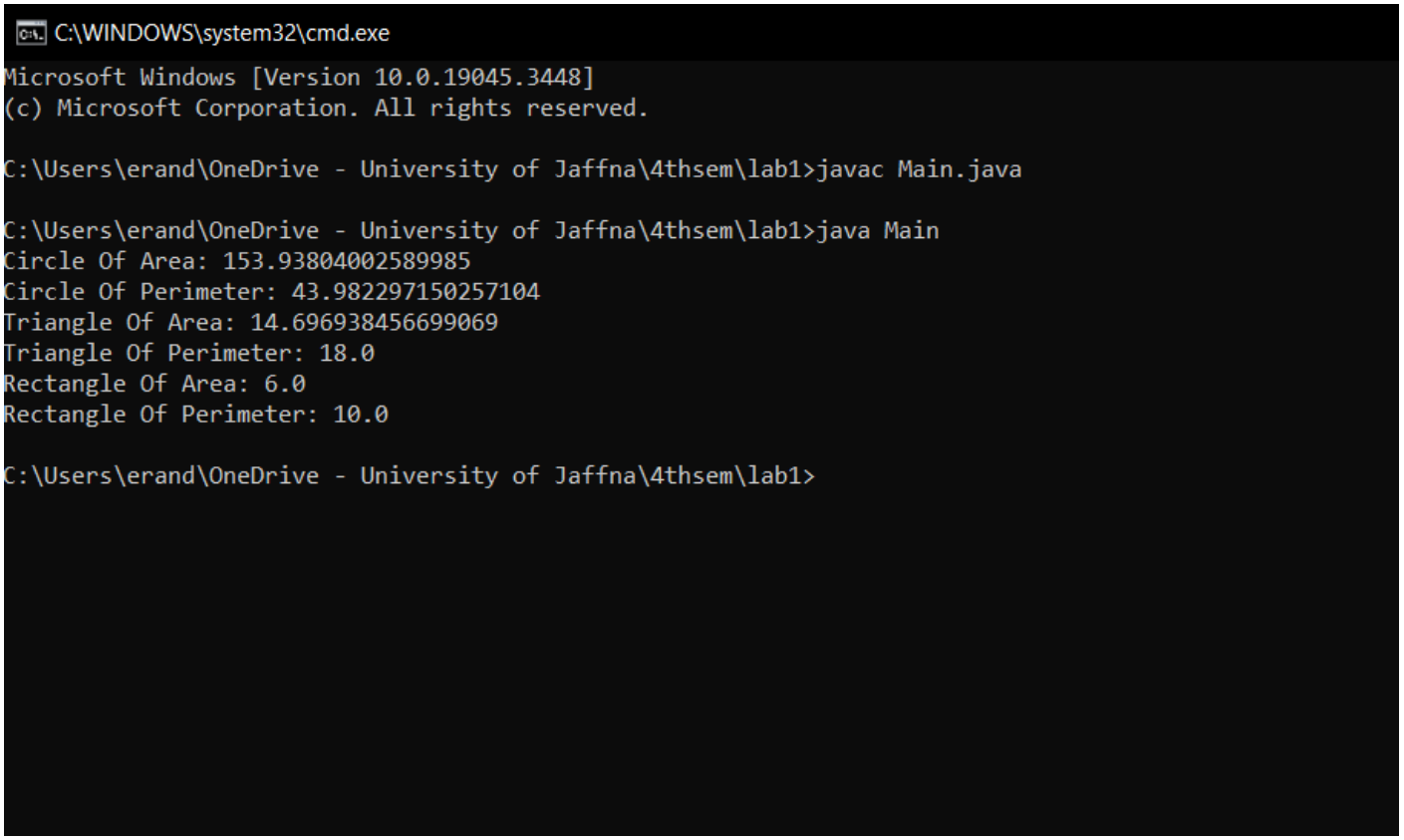
C:\WINDOWS\system32\cmd.exe
Microsoft Windows [Version 10.0.19045.3448]
(c) Microsoft Corporation. All rights reserved.
C:\Users\erand\OneDrive - University of Jaffna\4thsem\lab1>javac Main.java
C:\Users\erand\OneDrive - University of Jaffna\4thsem\lab1>java Main
Circle Of Area: 153.93804002589985
Circle Of Perimeter: 43.982297150257104
Triangle Of Area: 14.696938456699069
Triangle Of Perimeter: 18.0
Rectangle Of Area: 6.0
Rectangle Of Perimeter: 10.0
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