

# 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();
```

```
}
```

```
}
```

```
1  import java.util.Scanner;
2
3  public class Calculator {
4      private double num1;
5      private double num2;
6      private double sum;
7
8      public Calculator() {
9          num1 = 0;
10         num2 = 0;
11         sum = 0;
12     }
13
14     public void addition() {
15         sum = num1 + num2;
16     }
17
18     public void subtraction() {
19         sum = num1 - num2;
20     }
21
22     public void multiplication() {
23         sum = num1 * num2;
24     }
25
26     public void division() {
27         sum = num1 / num2;
28     }
29
30     public static void main(String[] args) {
31         Scanner scanner = new Scanner(System.in);
32         Calculator calculator = new Calculator();
33
34         System.out.print("Enter your first number : ");
35         calculator.num1 = scanner.nextDouble();
36
37         System.out.print("Enter your second number : ");
38         calculator.num2 = scanner.nextDouble();
39
40         System.out.print("Enter the op (+, -, *, /) : ");
41         char op = scanner.next().charAt(0);
42
43         switch (op) {
44             case '+':
45                 calculator.addition();
46                 break;
47             case '-':
48                 calculator.subtraction();
49                 break;
50             case '*':
51                 calculator.multiplication();
52                 break;
53             case '/':
54                 calculator.division();
55                 break;
56             default:
57                 System.out.println("Invalid op");
58                 break;
59         }
60
61         System.out.println("sum: " + calculator.sum);
62
63         scanner.close();
64     }
65 }
66
```

```
C:\WINDOWS\system32\cmd.exe
Microsoft Windows [Version 10.0.19045.3448]
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C:\Users\erand\OneDrive - University of Jaffna\4thsem\lab1>javac Calculator.java

C:\Users\erand\OneDrive - University of Jaffna\4thsem\lab1>java Calculator
Enter your first number : 15
Enter your second number : 65
Enter the op (+, -, *, /) : +
sum: 80.0

C:\Users\erand\OneDrive - University of Jaffna\4thsem\lab1>java Calculator
Enter your first number : 45
Enter your second number : 15
Enter the op (+, -, *, /) : -
sum: 30.0

C:\Users\erand\OneDrive - University of Jaffna\4thsem\lab1>java Calculator
Enter your first number : 8
Enter your second number : 4
Enter the op (+, -, *, /) : *
sum: 32.0

C:\Users\erand\OneDrive - University of Jaffna\4thsem\lab1>java Calculator
Enter your first number : 64
Enter your second number : 8
Enter the op (+, -, *, /) : /
sum: 8.0

C:\Users\erand\OneDrive - University of Jaffna\4thsem\lab1>
```

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());
    }
}
```

```

1  abstract class Shape {
2      abstract double calculateArea();
3      abstract double calculatePerimeter();
4  }
5
6  class Circle extends Shape {
7      private double radius;
8
9      public Circle(double radius) {
10         this.radius = radius;
11     }
12
13     double calculateArea() {
14         return Math.PI*radius*radius;
15     }
16
17     double calculatePerimeter() {
18         return 2*Math.PI*radius;
19     }
20 }
21
22 class Triangle extends Shape {
23     private double s1, s2, s3;
24
25     public Triangle(double s1, double s2, double s3) {
26         this.s1 = s1;
27         this.s2 = s2;
28         this.s3 = s3;
29     }
30
31     double calculateArea() {
32         double s = (s1 + s2 + s3) / 2;
33         return Math.sqrt(s * (s - s1) * (s - s2) * (s - s3));
34     }
35
36     double calculatePerimeter() {
37         return s1 + s2 + s3;
38     }
39 }
40
41 class Rectangle extends Shape {
42     private double length, width;
43
44     public Rectangle(double length, double width) {
45         this.length = length;
46         this.width = width;
47     }
48
49     double calculateArea() {
50         return length * width;
51     }
52
53     double calculatePerimeter() {
54         return 2 * (length + width);
55     }
56 }
57
58 public class Main {
59     public static void main(String[] args) {
60         Circle circle = new Circle(7);
61         System.out.println("Circle Of Area: " + circle.calculateArea());
62         System.out.println("Circle Of Perimeter: " + circle.calculatePerimeter());
63
64         Triangle triangle = new Triangle(5,6,7);
65         System.out.println("Triangle Of Area: " + triangle.calculateArea());
66         System.out.println("Triangle Of Perimeter: " + triangle.calculatePerimeter());
67
68         Rectangle rectangle = new Rectangle(2,3);
69         System.out.println("Rectangle Of Area: " + rectangle.calculateArea());
70         System.out.println("Rectangle Of Perimeter: " + rectangle.calculatePerimeter());
71     }
72 }

```



C:\WINDOWS\system32\cmd.exe

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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

C:\Users\erand\OneDrive - University of Jaffna\4thsem\lab1>