JAVA LAB Assignment: 5

Shapes

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Code:

```
// Main.java
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import java.util.Scanner;

public class Main {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        int choice;
        do {
            System.out.println("Select a shape:");
            System.out.println("1. Circle\n2. Rectangle\n3. Square\n4. Sphere\n5. Cylinder\n6. Equilateral Pyramid\n7. Exit");
            choice = scanner.nextInt();
            switch (choice) {
                case 1:
                    Circle circle = new Circle();
                    circle.getInput(scanner);
                    circle.calculateShape();
                    circle.calculatePerimeter();
                    break;
                case 2:
                    Rectangle rectangle = new Rectangle();
                    rectangle.getInput(scanner);
                    rectangle.calculateShape();
                    rectangle.calculatePerimeter();
                    break;
                case 3:
                    Square square = new Square();
                    square.getInput(scanner);
                    square.calculateShape();
                    square.calculatePerimeter();
                    break;
                case 4:
                    Sphere sphere = new Sphere();
                    sphere.getInput(scanner);
                    System.out.println("Volume: " + sphere.calculateVolume());
                    System.out.println("Surface Area: " + sphere.calculateSurfaceArea());
                    sphere.calculateVolume();
                    break;
                case 5:
                    Cylinder cylinder = new Cylinder();
                    cylinder.getInput(scanner);
                    cylinder.calculateShape();
                    cylinder.calculateVolume();
                    break;
                case 6:
```

```
            case 6:
                EquilateralPyramid pyramid = new EquilateralPyramid();
                pyramid.getInput(scanner);
                pyramid.calculateShape();
                pyramid.calculateVolume();
                break;
            case 7:
                System.out.println("Exiting program.");
                break;
            default:
                System.out.println("Invalid choice. Please select again.");
        }
    } while (choice != 7);
    scanner.close();
  }
}
```

```
// Shape.java
import java.util.Scanner;
abstract class Shape {
    protected String shapeName;

    public Shape(String shapeName) {
        this.shapeName = shapeName;
    }

    abstract void calculateShape();
    abstract void calculatePerimeter();
}
```

```java
// Cylinder.java
import java.util.Scanner;

class Cylinder extends Shape implements Volume {
    private double radius, height;

    public Cylinder() {
        super("Cylinder");
    }

    public void getInput(Scanner scanner) {
        System.out.print("Enter radius of the cylinder: ");
        radius = scanner.nextDouble();
        System.out.print("Enter height of the cylinder: ");
        height = scanner.nextDouble();
    }

    public void calculateShape() {
        System.out.println("Surface Area of Cylinder: " + (2 * Math.PI * radius * (radius + height)));
    }

    public void calculateVolume() {
        System.out.println("Volume of Cylinder: " + Math.PI * radius * radius * height);
    }

    public void calculatePerimeter() {
        System.out.println("A cylinder does not have a perimeter.");
    }
}
```

```java
// Square.java
import java.util.Scanner;

class Square extends Shape {
    private double side;

    public Square() {
        super("Square");
    }

    public void getInput(Scanner scanner) {
        System.out.print("Enter side of the square: ");
        side = scanner.nextDouble();
    }

    public void calculateShape() {
        System.out.println("Area of Square: " + side * side);
    }

    public void calculatePerimeter() {
        System.out.println("Perimeter of Square: " + 4 * side);
    }
}
```

```java
// Circle.java
import java.util.Scanner;

class Circle extends Shape {
    private double radius;

    public Circle() {
        super("Circle");
    }

    public void getInput(Scanner scanner) {
        System.out.print("Enter radius of the circle: ");
        radius = scanner.nextDouble();
    }

    public void calculateShape() {
        System.out.println("Area of Circle: " + Math.PI * radius * radius);
    }

    public void calculatePerimeter() {
        System.out.println("Perimeter of Circle: " + 2 * Math.PI * radius);
    }
}
```

```java
// Volume.java
import java.util.Scanner;

interface Volume {
    void calculateVolume();
}
```

```java
// EquilateralPyramid.java
import java.util.Scanner;

class EquilateralPyramid extends Shape implements Volume {
    private double base, height;

    public EquilateralPyramid() {
        super("Equilateral Pyramid");
    }

    public void getInput(Scanner scanner) {
        System.out.print("Enter base length of the pyramid: ");
        base = scanner.nextDouble();
        System.out.print("Enter height of the pyramid: ");
        height = scanner.nextDouble();
    }

    public void calculateShape() {
        double slantHeight = Math.sqrt((base / 2) * (base / 2) + height * height);
        double lateralSurfaceArea = 2 * base * slantHeight;
        double baseArea = base * base;
        System.out.println("Surface Area of Pyramid: " + (lateralSurfaceArea + baseArea));
    }

    public void calculateVolume() {
        System.out.println("Volume of Pyramid: " + (1.0 / 3) * base * base * height);
    }

    public void calculatePerimeter() {
        System.out.println("Perimeter of Pyramid Base: " + (4 * base));
    }
}
```

```java
// Rectangle.java
import java.util.Scanner;

class Rectangle extends Shape {
    private double length, width;

    public Rectangle() {
        super("Rectangle");
    }

    public void getInput(Scanner scanner) {
        System.out.print("Enter length of the rectangle: ");
        length = scanner.nextDouble();
        System.out.print("Enter width of the rectangle: ");
        width = scanner.nextDouble();
    }

    public void calculateShape() {
        System.out.println("Area of Rectangle: " + (length * width));
    }

    public void calculatePerimeter() {
        System.out.println("Perimeter of Rectangle: " + (2 * (length + width)));
    }
}
```

```java
//Sphere.java
import java.util.Scanner;

public class Sphere {
    private double radius;

    public Sphere() {
        this.radius = 0;
    }

    public void getInput(Scanner scanner) {
        System.out.print("Enter the radius of the sphere: ");
        this.radius = scanner.nextDouble();
    }

    public double calculateVolume() {
        return (4.0 / 3.0) * Math.PI * Math.pow(radius, 3);
    }

    public double calculateSurfaceArea() {
        return 4 * Math.PI * Math.pow(radius, 2);
    }

    public void display() {
        System.out.println("Sphere Details:");
        System.out.println("Radius: " + radius);
        System.out.println("Volume: " + calculateVolume());
        System.out.println("Surface Area: " + calculateSurfaceArea());
    }
}
```

Output:

```
C:\Users\rishi\OneDrive\Desktop\Shapes>java Main
Select a shape:
1. Circle
2. Rectangle
3. Square
4. Sphere
5. Cylinder
6. Equilateral Pyramid
7. Exit
1
Enter radius of the circle: 20
Area of Circle: 1256.6370614359173
Perimeter of Circle: 125.66370614359172
Select a shape:
1. Circle
2. Rectangle
3. Square
4. Sphere
5. Cylinder
6. Equilateral Pyramid
7. Exit
2
Enter length of the rectangle: 5
Enter width of the rectangle: 3
Area of Rectangle: 15.0
Perimeter of Rectangle: 16.0
Select a shape:
1. Circle
2. Rectangle
3. Square
4. Sphere
5. Cylinder
6. Equilateral Pyramid
7. Exit
3
Enter side of the square: 8
Area of Square: 64.0
Perimeter of Square: 32.0
Select a shape:
1. Circle
```

```
1. Circle
2. Rectangle
3. Square
4. Sphere
5. Cylinder
6. Equilateral Pyramid
7. Exit
4
Enter the radius of the sphere: 25
Volume: 65449.84694978735
Surface Area: 7853.981633974483
Select a shape:
1. Circle
2. Rectangle
3. Square
4. Sphere
5. Cylinder
6. Equilateral Pyramid
7. Exit
5
Enter radius of the cylinder: 42
Enter height of the cylinder: 12
Surface Area of Cylinder: 14250.264276683301
Volume of Cylinder: 66501.23329118875
Select a shape:
1. Circle
2. Rectangle
3. Square
4. Sphere
5. Cylinder
6. Equilateral Pyramid
7. Exit
2
Enter length of the rectangle: 4
Enter width of the rectangle: 6
Area of Rectangle: 24.0
Perimeter of Rectangle: 20.0
Select a shape:
1. Circle
2. Rectangle
3. Square
```

```
Enter width of the rectangle: 6
Area of Rectangle: 24.0
Perimeter of Rectangle: 20.0
Select a shape:
1. Circle
2. Rectangle
3. Square
4. Sphere
5. Cylinder
6. Equilateral Pyramid
7. Exit
6
Enter base length of the pyramid: 2
Enter height of the pyramid: 4
Surface Area of Pyramid: 20.4924225024706 42
Volume of Pyramid: 5.333333333333333
Select a shape:
1. Circle
2. Rectangle
3. Square
4. Sphere
5. Cylinder
6. Equilateral Pyramid
7. Exit
6
Enter base length of the pyramid: 56
Enter height of the pyramid: 23
Surface Area of Pyramid: 7194.35828876653
Volume of Pyramid: 24042.666666666664
Select a shape:
1. Circle
2. Rectangle
3. Square
4. Sphere
5. Cylinder
6. Equilateral Pyramid
7. Exit
7
Exiting program.

C:\Users\rishi\OneDrive\Desktop\Shapes>
```

Github Repo Link:
https://github.com/RishiSelam/Shapes.java