CSC 1109 Lab 5

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Question 1

Listing 1: GeometricObject.java

```java
public class GeometricObject {
    private String color;
    private boolean filled;
    private java.util.Date dateCreated;

    public GeometricObject() {
        this.color = "white";
        this.filled = false;
        this.dateCreated = new java.util.Date();
    }

    public GeometricObject(String color, boolean filled){
        this.color = color;
        this.filled = filled;
        this.dateCreated = new java.util.Date();
    }

    public String getColor() {
        return color;
    }

    public void setColor(String color) {
        this.color = color;
    }

    public boolean isFilled() {
        return filled;
    }

    public void setFilled(boolean filled) {
        this.filled = filled;
    }

    public java.util.Date getDateCreated() {
        return dateCreated;
```

```java
36      }
37
38      public String toString(){
39          return " created on " + dateCreated + "\ncolor: " + color + " and ↩
                filled: " + filled;
40      }
41  }
```

Listing 2: CircleFromSimpleGeometricObject.java

```java
1  public class CircleFromSimpleGeometricObject extends GeometricObject{
2      private double radius;
3
4      public CircleFromSimpleGeometricObject(){
5          super();
6      }
7
8      public CircleFromSimpleGeometricObject(double radius){
9          super();
10         this.radius = radius;
11     }
12
13     public CircleFromSimpleGeometricObject(double radius, String color, ↩
            boolean filled){
14         super();
15         this.radius = radius;
16     }
17
18     public double getRadius() {
19         return this.radius;
20     }
21
22     public void setRadius(double radius) {
23         this.radius = radius;
24     }
25
26     public double getArea(){
27         return Math.PI * Math.pow(this.radius, 2);
28     }
29
30     public double getPerimeter(){
31         return 2 * Math.PI * this.radius;
32     }
33
34     public double getDiameter(){
35         return 2 * this.radius;
```

```
36      }
37
38      public void printCircle(){
39          System.out.println("The color is " + getColor() + "\nThe area is "↩
                + getArea() + "\nthe diameter is " + getDiameter());
40      }
41  }
```

Listing 3: RectangleFromSimpleGeometricObject.java

```
1   public class RectangleFromSimpleGeometricObject extends GeometricObject{
2       private double width;
3       private double height;
4
5       public RectangleFromSimpleGeometricObject(){
6           super();
7       }
8       public RectangleFromSimpleGeometricObject(double width, double height)↩
            {
9           super();
10          this.width = width;
11          this.height = height;
12      }
13      public RectangleFromSimpleGeometricObject(double width, double height,↩
            String color, boolean filled){
14          super(color, filled);
15          this.width = width;
16          this.height = height;
17      }
18
19      public double getWidth() {
20          return this.width;
21      }
22
23      public void setWidth(double width) {
24          this.width = width;
25      }
26
27      public double getHeight(){
28          return this.height;
29      }
30
31      public double setHeight(){
32          return this.height;
33      }
34
```

```
35      public double getArea(){
36          return this.width * this.height;
37      }
38
39      public double getPerimeter(){
40          return 2 * (this.width + this.height);
41      }
42  }
```

Listing 4: TestCircleRectangle.java

```
1  public class TestCircleRectangle {
2      public static void main(String[] args){
3          CircleFromSimpleGeometricObject circle = new ↩
               CircleFromSimpleGeometricObject(1);
4          System.out.println("A circle " + circle.toString());
5          System.out.println("The color is " + circle.getColor());
6          System.out.println("The radius is " + circle.getRadius());
7          System.out.println("The area is " + circle.getArea());
8          System.out.println("The diameter is " + circle.getDiameter());
9
10         RectangleFromSimpleGeometricObject rectangle = new ↩
               RectangleFromSimpleGeometricObject(2, 4);
11         System.out.println("A rectangle " + rectangle.toString());
12         System.out.println("The area is " + rectangle.getArea());
13         System.out.println("The perimeter is " + rectangle.getPerimeter())↩
               ;
14     }
15 }
```

Listing 5: TestCircleRectangle.java

```
1  A circle  created on Fri Jan 27 15:07:16 SGT 2023
2  color: white and filled: false
3  The color is white
4  The radius is 1.0
5  The area is 3.141592653589793
6  The diameter is 2.0
7  A rectangle  created on Fri Jan 27 15:07:16 SGT 2023
8  color: white and filled: false
9  The area is 8.0
10 The perimeter is 12.0
```

Question 2

Listing 6: Shape.java

```java
public abstract class Shape {
    public float dim1;
    public float dim2;
    public float PI = 3.14f;

    public Shape(float dim1, float dim2) {
        this.dim1 = dim1;
        this.dim2 = dim2;
    }

    public abstract float area();
}
```

Listing 7: Circle.java

```java
public class Circle extends Shape{

    public Circle(float dim1, float dim2) {
        super(dim1, dim2);
    }
    public float area() {
        return dim1 * dim1 * PI;
    }
}
```

Listing 8: Ellipse.java

```java
public class Ellipse extends Shape{
    public Ellipse(float dim1, float dim2) {
        super(dim1, dim2);
    }
    public float area() {
        return dim1 * dim2 * PI;
    }
}
```

Listing 9: Rectangle.java

```java
public class Rectangle extends Shape{

    public Rectangle(float dim1, float dim2) {
        super(dim1, dim2);
    }
    public float area() {
        return dim1 * dim2;
    }

}
```

Listing 10: Square.java

```java
public class Square extends Shape{

    public Square(float dim1, float dim2) {
        super(dim1, dim2);
    }
    public float area() {
        return dim1 * dim2;
    }
}
```

Listing 11: Triangle.java

```java
public class Triangle extends Shape{

    public Triangle(float dim1, float dim2) {
        super(dim1, dim2);
    }
    public float area() {
        return 0.5f * dim1 * dim2 ;
    }
}
```

Listing 12: ShapeTest.java

```java
public class ShapeTest {
    public static void main(String[] args){
        Rectangle r = new Rectangle(9,5);
        Triangle t= new Triangle(10,8);
        Circle c = new Circle(5,5);
        Ellipse e = new Ellipse(7,7);
        Square s = new Square(6,6);
        Shape figref;
        figref = r;

        System.out.println("Inside Area for Rectangle.");
        System.out.println("Area is " + figref.area());
        figref = t;
        System.out.println("Inside Area for Triangle.");
        System.out.println("Area is " + figref.area());
        figref = c;
        System.out.println("Inside Area for Circle.");
        System.out.println("Area is " + figref.area());
        figref = e;
        System.out.println("Inside Area for Ellipse.");
        System.out.println("Area is " + figref.area());
        figref = s;
        System.out.println("Inside Area for Square.");
        System.out.println("Area is " + figref.area());

    }
}
```

Listing 13: ShapeTest.java Output

```
Inside Area for Rectangle.
Area is 45.0
Inside Area for Triangle.
Area is 40.0
Inside Area for Circle.
Area is 78.5
Inside Area for Ellipse.
Area is 153.86
Inside Area for Square.
Area is 36.0
```