**Lab Assignment 09**

**SENG102, Spring 2022/23**

Question01:

Create a `Shape` class that has a method `calculateArea()` that calculates the area of the shape. Then create two subclasses, `Rectangle` and `Circle`, that extend the `Shape` class.

- In the `Rectangle` class, create a method `calculateArea()` that calculates the area of a rectangle using the formula `length * width`.
- In the `Circle` class, create a method `calculateArea()` that calculates the area of a circle using the formula `pi * radius^2`.

Next, create a `ShapeCalculator` class that has two methods, `calculateArea(Rectangle r)` and `calculateArea(Circle c)`. Each of these methods should call the `calculateArea()` method of the appropriate shape and return the calculated area.

You are required to use the following Main class:

```
public class Main {
    public static void main(String[] args) {
        Rectangle r = new Rectangle(5, 10);
        Circle c = new Circle(7);
        ShapeCalculator calculator = new ShapeCalculator();
        double rectangleArea = calculator.calculateArea(r);
        System.out.println("The area of the rectangle is " + rectangleArea);
        double circleArea = calculator.calculateArea(c);
        System.out.println("The area of the circle is " + circleArea);
    }
}
```

**Sample output for this main should be:**

```
The area of the rectangle is 50.0
The area of the circle is 153.93804002589985
```

**Hint**: Use Math.PI.

Question02:

Now addition to your code you need to overload methods, by following:

1. Change calculateArea in a way that user can enter a custom pi number in double form to be used in calculation process.
2. Change calculateArea in a way that user can add a Boolean as an input, which will affect the calculation of rectangle. In case of a true Boolean value, code will only multiply length by length instead of length by width.

You should use the following Main code:

```
public class Main {

public static void main(String[] args) {

Rectangle r = new Rectangle(5, 10);

Circle c = new Circle(7);

double pii = 3.14;

ShapeCalculator calculator = new ShapeCalculator();

double rectangleArea = calculator.calculateArea(r);

System.out.println("The area of the rectangle is " + rectangleArea);

double rectangleArea2 = calculator.calculateArea(r,true);

System.out.println("The area of the square is " + rectangleArea2);

double rectangleArea3 = calculator.calculateArea(r,false);

System.out.println("The area of the not square is " + rectangleArea3);

double circleArea = calculator.calculateArea(c);

System.out.println("The area of the circle is " + circleArea);

double circleArea2 = calculator.calculateArea(c,pii);

System.out.println("The area of the circle is " + circleArea2);

}

}
```

**Output should be:**

```
The area of the rectangle is 50.0

The area of the square is 25.0
```

```
The area of the not square is 50.0

The area of the circle is 153.93804002589985

The area of the circle is 153.86
```