Assignment4

Design a class named **Rectangle**. The class contains:

a. Five private data fields [10 points]
   - **x** (double) : The x position of the center. In a valid rectangle, the range of x is in (-10, 10)
   - **y** (double) : The y position of the center. In a valid rectangle, the range of y is in (-10, 10)
   - **width** (double) : The width of the rectangle. In a valid rectangle, the range of width is in [0, 5]
   - **height**(double) : The height of the rectangle. In a valid rectangle, the range of height is in [0, 5]
   - **color** (java.awt.Color): The color of rectangle.

b. Design three **constructors**: [10 points]
   1. A constructor with two parameters including **x** and **y**
   2. A constructor with four parameters including **x**, **y**, **width** and **height**.
   3. A constructor with seven parameters, the first four parameters are double type, which represent the **x**, **y**, **width** and **height** of current rectangle, and the last three parameters are integers, which represent the **red**, **green** and **blue** value of current color respectively.
   - If a rectangle has no width and height, in constructor method we need to set width=1 and height=1 as default value.
   - If a rectangle has no color, in constructor method we need to set a default color whose red, green and blue value are all 100.
   - For the third constructor, if the value of red green and blue are larger than 255 or smaller than 0, we need to set it as its closest boundary value.

c. Design the **getter** and **setter** method for each private field of Rectangle. [10 points]

d. Design a **toString()** method, which can return a String value as following output format. [10 points]

The first test:

```
public class Test1 {
    public static void main(String[] args) {
        Rectangle r1=new Rectangle(0,1,2,2,100,150,100);
        Rectangle r2=new Rectangle(3,1,3,1,-1,350,100);
        Rectangle r3=new Rectangle(2,2);
        Rectangle r4=new Rectangle(3,-1,2,2);
        System.out.println(r1);
```

```
        System.out.println(r2);
        System.out.println(r3);
        System.out.println(r4);
}
}
```

```
Centre[0.0,1.0] Shape[2.0,2.0] Color[100,150,100]
Centre[3.0,1.0] Shape[3.0,1.0] Color[0,255,100]
Centre[2.0,2.0] Shape[1.0,1.0] Color[100,100,100]
Centre[3.0,-1.0] Shape[2.0,2.0] Color[100,100,100]
```

e. Design a public method named **intersect()** with a Rectangle parameter and a return value (boolean). If the current rectangle is intersected with the parameter rectangle, it will return true, otherwise it will return false. [10 points]

f. Design a public static method named **intersect()** with two Rectangle parameters and a return value (boolean). If two rectangles are intersected, it will return true, otherwise it will return false. [10 points]

The Second Test:

```
public class Test2 {
    public static void main(String[] args) {
        Rectangle r1=new Rectangle(0,0,2,2,100,50,100);
        Rectangle r2=new Rectangle(1.5,2,3,1,-1,350,100);
        Rectangle r3=new Rectangle(1.6,-1,1,3,50,100,200);
        Rectangle r4=new Rectangle(1,1,1,2,180,100,40);

        System.out.println(r1.intersect(r2));
        System.out.println(r1.intersect(r3));
        System.out.println(r1.intersect(r4));
        System.out.println(Rectangle.intersect(r3, r4));
    }
}
```

```
false
false
true
true
```

g. Design a public method named **isValid()** with a return value (boolean). Only when the range of its width and height are in [0, 5] (0 and 5 are included) and

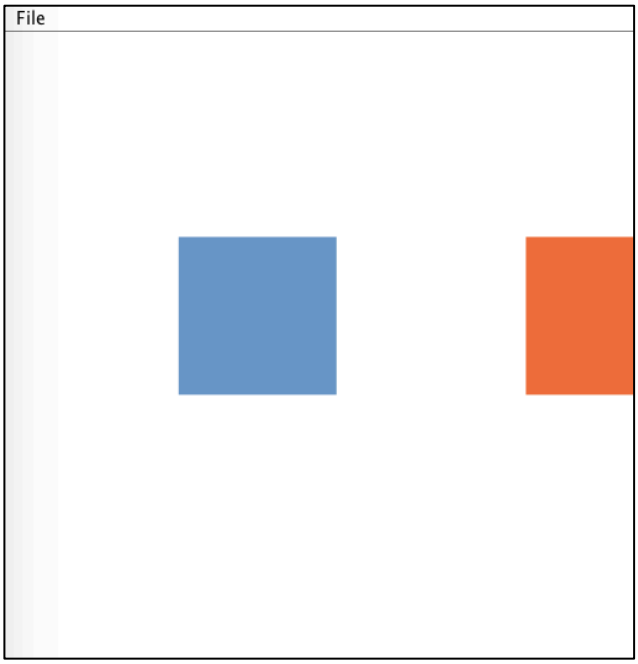
the range of it x and y position are in (-10,10) (-10 and 10 are not included), it will return true, otherwise it will return false. [10 points]

h. Design a public method named **isInBoundary()** with a return value (boolean). If the whole rectangle can be drawn in the screen (-10,10), it will return true, otherwise it will return false. [10 points]

The third Test:

```
Rectangle r1=new Rectangle(-2,1,5,5,100,150,200);
Rectangle r2=new Rectangle(9,1,5,5,250,100,40);
System.out.println(r1.isInBoundary());
System.out.println(r2.isInBoundary()); ‘
```

(The whole rectangle of the blue one can be drawn in the screen, so it is in boundary, but the orange one is not.)



i. In same package, we create a class named **RectangleTest**, in which there is a main method. In main method, we will read several lines as following format. For each line, we need create an object of Rectangle according to the data in line. After that, we need to output all **valid rectangles**, which are not **intersect** with the **first valid rectangle** in the line order. [10 points]

The fourth Test:

Sample input:

9.27,6.61,3,7.18,209,144,247
3.4,4.0,4.5,4.5,100,100,100
-2.89,7.61,5.57,5.06
8.43,6.66
7.42,0.68,2.07,2.93,78,39,165
6.70,1.54,3.52,3.12
1.14,0.76,2.37,3.07,236,105,137
1.06,-0.80,3.03,2.66,132,120,273
3.01,-9.08,2.76,2.36,138,148,119
-0.51,-4.99,6.42,5.65
-4.36,8.70,3.03,2.63,16,138,221
9.40,2.41,6.47,4.90

Sample output:

```
Centre[8.4,6.7] Shape[1.0,1.0] Color[100,100,100]
Centre[7.4,0.7] Shape[2.1,2.9] Color[78,39,165]
Centre[1.1,-0.8] Shape[3.0,2.7] Color[132,120,255]
Centre[3.0,-9.1] Shape[2.8,2.4] Color[138,148,119]
Centre[-4.4,8.7] Shape[3.0,2.6] Color[16,138,221]
```

j. Design a public method named **draw()** , in which we need to draw the current rectangle in screen. We need to make sure that: [10 points]
   - Only draw the valid rectangle.
   - The rectangle in screen needs to have its color.

   In main method, adding following two statements, just before you using draw method.

   StdDraw.*setXscale*(-10,10);
   StdDraw.*setYscale*(-10,10);

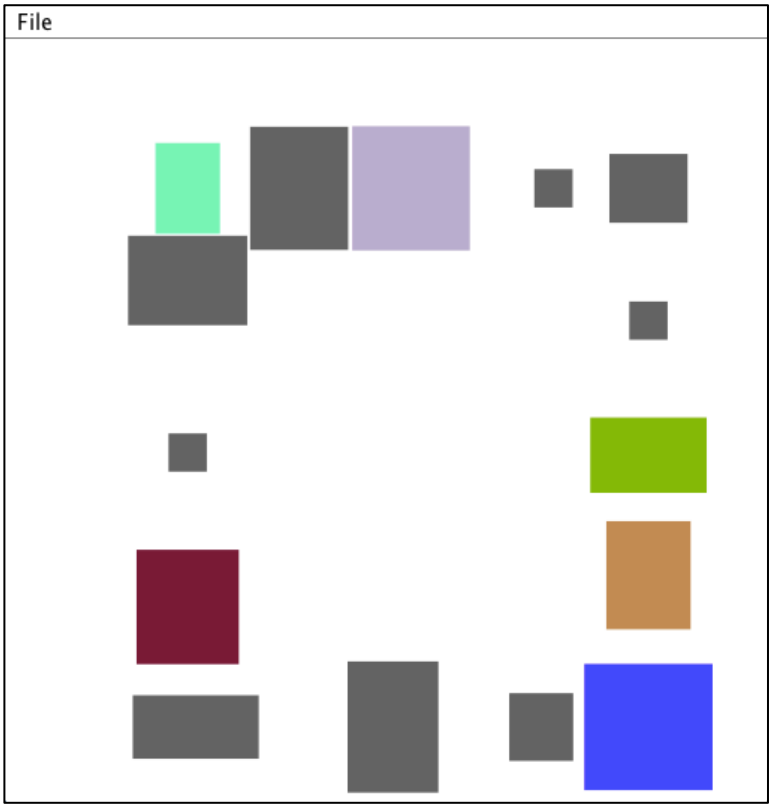
The fifth Test:

Sample input:

-4.98,-8.00,3.29,1.66
0.17,-8.00,2.37,3.43
4.04,-8.00,1.67,1.77
6.84,-8.00,3.35,3.30,87,9,260
6.84,-4.03,2.20,2.83,200,139,78
6.84,-0.89,3.04,1.97,122,195,14
6.84,2.63
6.84,6.09,2.04,1.80
4.36,6.09

0.64,6.09,3.07,3.25,-10,299,288
-2.28,6.09,2.56,3.22
-5.19,6.09,1.68,2.37,-20,-30,184
-5.19,3.68,3.11,2.34
-5.19,-0.82
-5.19,-4.86,2.67,2.99,129,7,49

Sample output:

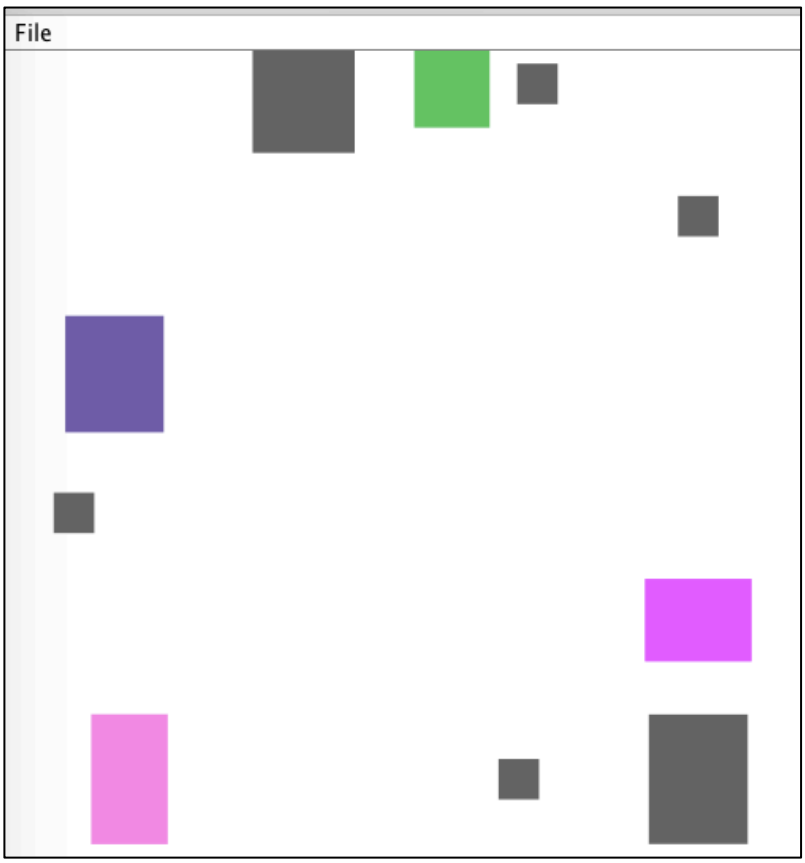


Sample input:

-1.96,-8.00,2.99,-2.39,230,119,148
2.80,-8.00
7.23,-8.00,2.44,3.20
7.23,-4.07,2.63,2.04,241,27,267
7.23,0.57,8.84,1.98
7.23,5.91
7.23,9.18,-2.15,2.26
3.26,9.18
1.15,9.18,1.86,2.16,69,204,101
-2.51,9.18,2.52,3.41
-5.18,9.18,-1.02,3.17

-6.18,6.75,-2.51,2.22,81,26,176
-7.18,2.01,2.43,2.88,116,85,169
-8.18,-1.42

Sample output:



What to submit

1. Please submit three ".java" files including "**Rectangle.java**" "**RectangleTest.java" and "StdDraw.java"** , and make sure that those ".java" files have no package information included.
   - **Rectangle.java**: It is for you to create and edit all questions.
   - **RectangleTest.java:** It is for you to add necessary code to finish question i, and do not remove other code in this file.
   - **StdDraw.java:** You can do no change about this file, but do not forget to remove package information if you added it.
2. Please submit those three files into sakai website before deadline.