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Course: Java Programming 1  
Homework 5  
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**Source:**

**Shape.java:**

```
public abstract class Shape {  
    private static int count = 0;  
  
    public Shape() {  
        count++;  
    }  
  
    public static int numShapes() {  
        return count;  
    }  
  
    public abstract double area();  
}
```

**Circle.java:**

```
import java.lang.Math;  
  
public class Circle extends Shape {  
    private static int count = 0;  
  
    private double radius;  
  
    public Circle(double radius) {  
        super();  
        count++;  
        this.radius = radius;  
    }  
  
    public static int numCircles() {  
        return count;  
    }  
  
    public double area() {  
        return Math.PI * radius * radius;  
    }  
}
```

**Rectangle.java:**

```
public class Rectangle extends Shape {
    private static int count = 0;

    private double width;
    private double length;

    public Rectangle(double width, double length) {
        super();
        count++;
        this.width = width;
        this.length = length;
    }

    public static int numRectangles() {
        return count;
    }

    public double area() {
        return width * length;
    }
}
```

**Drawable.java:**

```
public interface Drawable {
    public void draw();
}
```

**GraphicCircle.java:**

```
public class GraphicCircle extends Circle implements Drawable {
    private int color = 0;

    public GraphicCircle(double radius, int color) {
        super(radius);
        this.color = color;
    }

    public void draw() {
        System.out.println(" circle drawn using color: " + color);
    }
}
```

**GraphicRectangle.java:**

```
public class GraphicRectangle extends Rectangle implements Drawable {
    private int color = 0;

    public GraphicRectangle(double width, double length, int color) {
        super(width, length);
        this.color = color;
    }

    public void draw() {
        System.out.println(" rectangle drawn using color: " + color);
    }
}
```

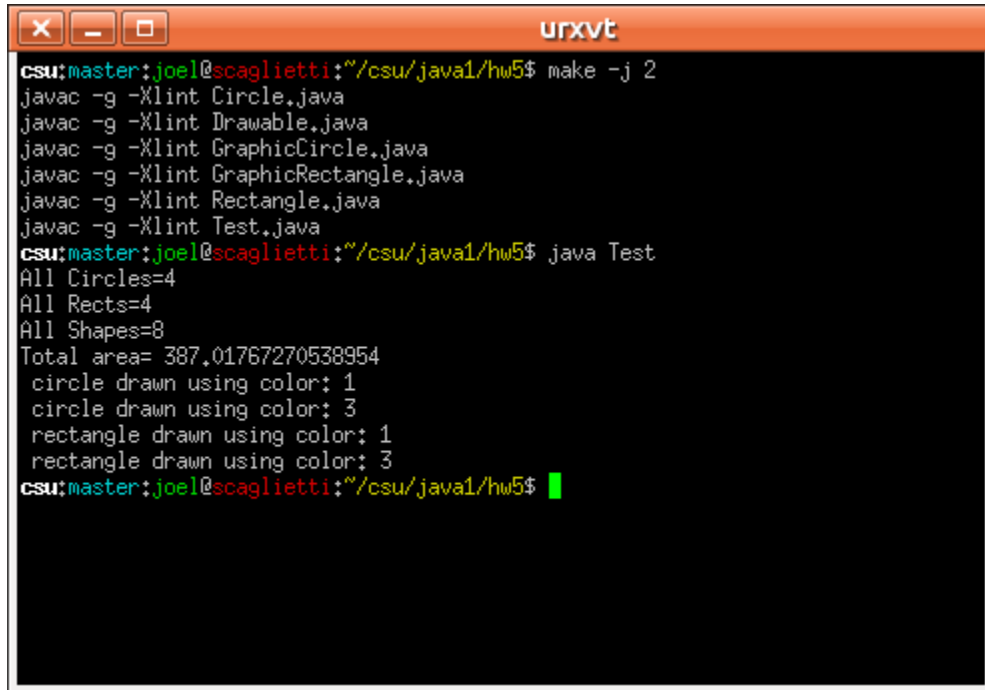
**Test Source:****Test.java:**

```
class Test{
    public static void main(String args[]) throws Exception{
        Circle x1 = new Circle(3);
        Circle x2 = new Circle(4);
        GraphicCircle c1 = new GraphicCircle(5,1);
        GraphicCircle c2 = new GraphicCircle(7,3);
        Rectangle y1 = new Rectangle (2,3);
        Rectangle y2 = new Rectangle (4,5);
        GraphicRectangle r1 = new GraphicRectangle (3,5,1);
        GraphicRectangle r2 = new GraphicRectangle (5,7,3);
        System.out.println("All Circles="+Circle.numCircles());
        System.out.println("All Rects="+Rectangle.numRectangles());
        System.out.println("All Shapes="+Shape.numShapes());

        Shape shapes[] = new Shape[8];
        shapes[0]=c1;
        shapes[1]=c2;
        shapes[2]=r1;
        shapes[3]=r2;
        shapes[4]=x1;
        shapes[5]=x2;
        shapes[6]=y1;
        shapes[7]=y2;
        double totalArea=0;
        for (int i=0; i<shapes.length; i++){
            totalArea+=shapes[i].area();
        }
        System.out.println("Total area= " +totalArea);
        Drawable drawables[] = new Drawable[4];
        drawables[0]=c1;
```

```
        drawables[1]=c2;
        drawables[2]=r1;
        drawables[3]=r2;
        for (int i=0; i<drawables.length; i++){
            drawables[i].draw();
        }
    }
}
```

### Test Output:

A terminal window titled 'urxvt' with a black background and orange title bar. It shows the output of a Java compilation and execution. The compilation step uses 'make -j 2' to compile several Java files with javac. The execution step runs 'java Test', which outputs statistics on shapes drawn and their total area.

```
csu:master:joel@scaglietti:~/csu/java1/hw5$ make -j 2
javac -g -Xlint Circle.java
javac -g -Xlint Drawable.java
javac -g -Xlint GraphicCircle.java
javac -g -Xlint GraphicRectangle.java
javac -g -Xlint Rectangle.java
javac -g -Xlint Test.java
csu:master:joel@scaglietti:~/csu/java1/hw5$ java Test
All Circles=4
All Rects=4
All Shapes=8
Total area= 387.01767270538954
  circle drawn using color: 1
  circle drawn using color: 3
  rectangle drawn using color: 1
  rectangle drawn using color: 3
csu:master:joel@scaglietti:~/csu/java1/hw5$
```