LAPORAN TUGAS MINGGU 6

Inheritance, Abstract Class and Interface in Java

Pemorgaman Berorientasi Objek

Resume ini disusun untuk memenuhi Tugas Mata Kuliah Pemrograman Berorientasi Objek

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PROGRAM STUDI D3 TEKNIK INFORMATIKA
JURUSAN TEKNIK KOMPUTER DAN INFORMATIKA
POLITEKNIK NEGERI BANDUNG
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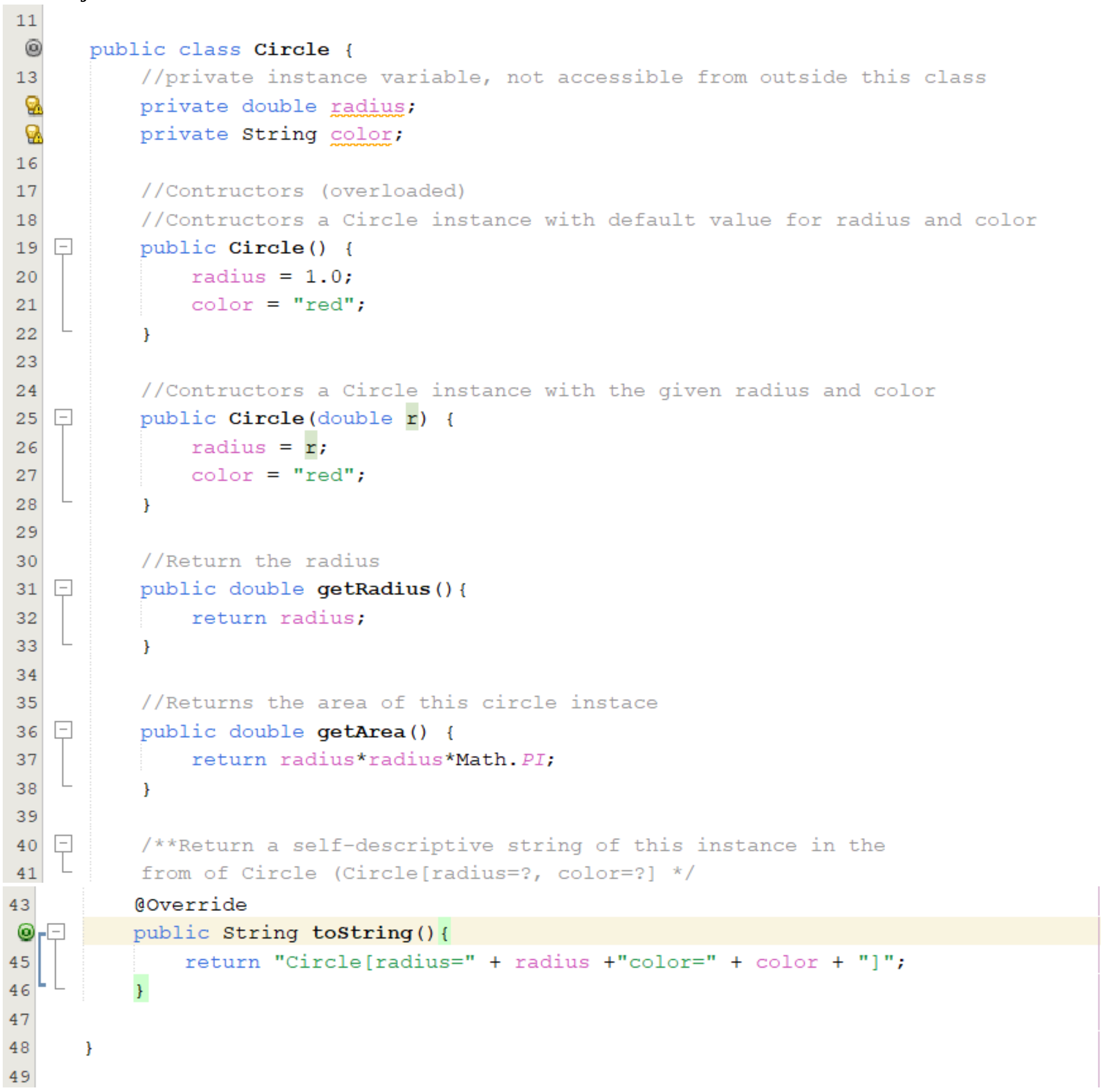
Exercise 1. The Circle and Cylinder Classes

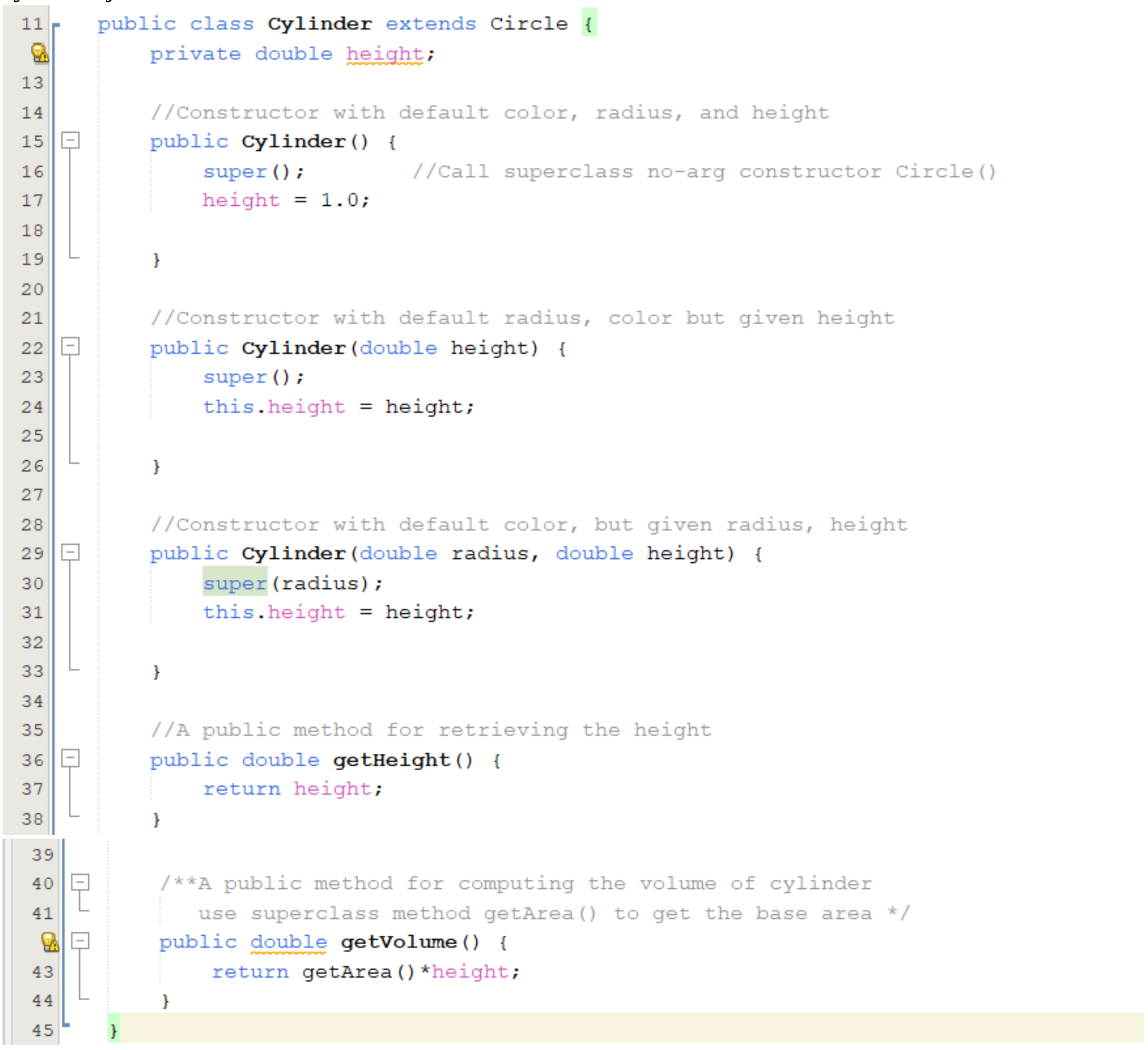
1. Source Code Asli

a) Circle.java



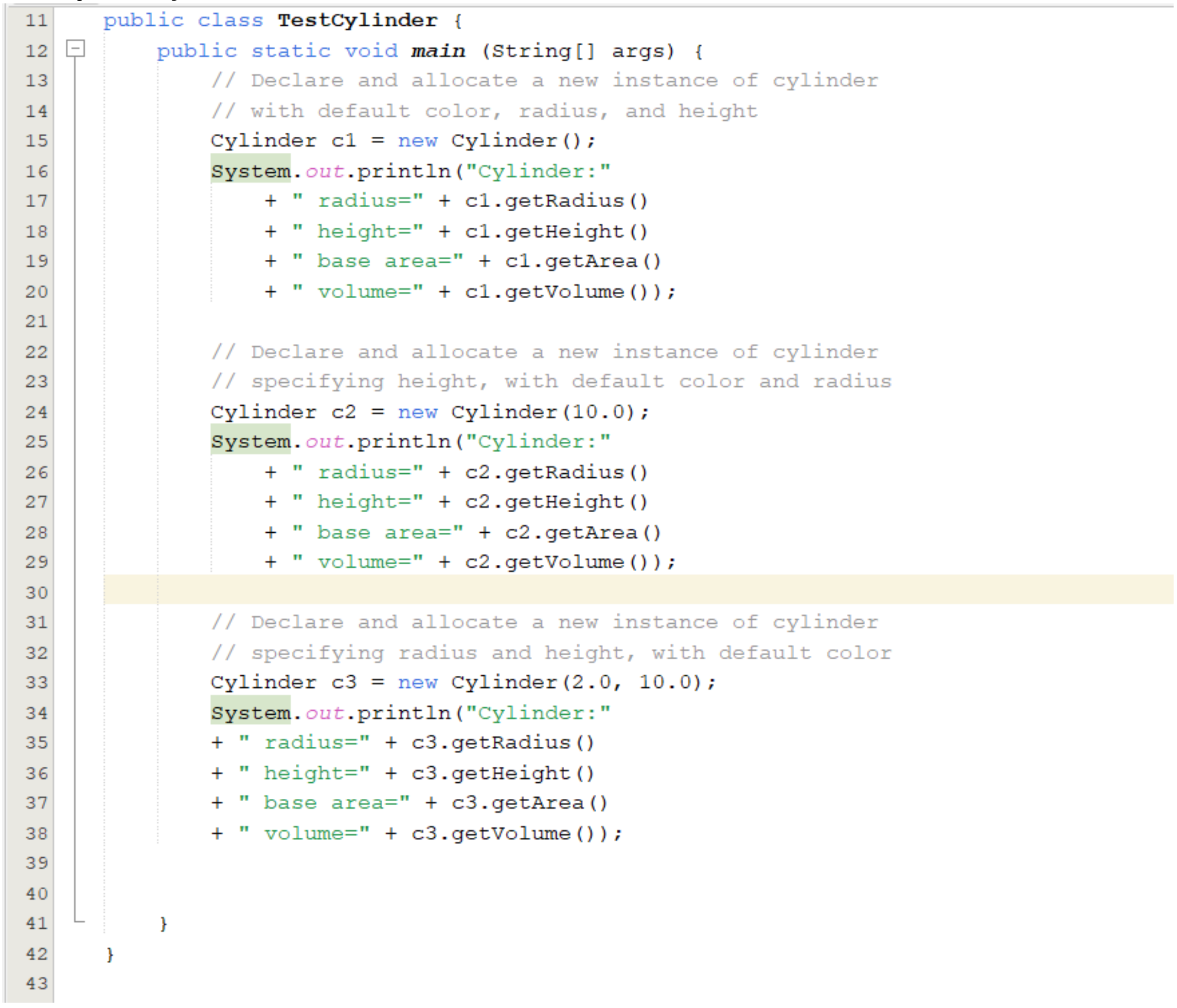
```java

public class Circle {
    //private instance variable, not accessible from outside this class
    private double radius;
    private String color;

    //Contructors (overloaded)
    //Contructors a Circle instance with default value for radius and color
    public Circle() {
        radius = 1.0;
        color = "red";
    }

    //Contructors a Circle instance with the given radius and color
    public Circle(double r) {
        radius = r;
        color = "red";
    }

    //Return the radius
    public double getRadius(){
        return radius;
    }

    //Returns the area of this circle instace
    public double getArea() {
        return radius*radius*Math.PI;
    }

    /**Return a self-descriptive string of this instance in the
    from of Circle (Circle[radius=?, color=?] */
    @Override
    public String toString(){
        return "Circle[radius=" + radius +"color=" + color + "]";
    }

}

```

b) Cylinder.java



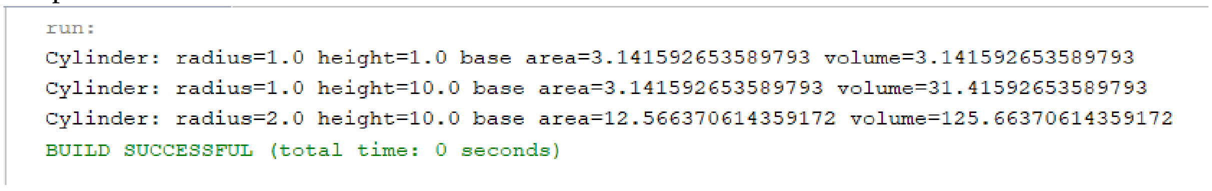
```java
public class Cylinder extends Circle {
    private double height;

    //Constructor with default color, radius, and height
    public Cylinder() {
        super();        //Call superclass no-arg constructor Circle()
        height = 1.0;

    }

    //Constructor with default radius, color but given height
    public Cylinder(double height) {
        super();
        this.height = height;

    }

    //Constructor with default color, but given radius, height
    public Cylinder(double radius, double height) {
        super(radius);
        this.height = height;

    }

    //A public method for retrieving the height
    public double getHeight() {
        return height;
    }

    /**A public method for computing the volume of cylinder
       use superclass method getArea() to get the base area */
    public double getVolume() {
        return getArea()*height;
    }
}
```

c) TestCylinder.java



```java
public class TestCylinder {
    public static void main (String[] args) {
        // Declare and allocate a new instance of cylinder
        // with default color, radius, and height
        Cylinder c1 = new Cylinder();
        System.out.println("Cylinder:"
            + " radius=" + c1.getRadius()
            + " height=" + c1.getHeight()
            + " base area=" + c1.getArea()
            + " volume=" + c1.getVolume());

        // Declare and allocate a new instance of cylinder
        // specifying height, with default color and radius
        Cylinder c2 = new Cylinder(10.0);
        System.out.println("Cylinder:"
            + " radius=" + c2.getRadius()
            + " height=" + c2.getHeight()
            + " base area=" + c2.getArea()
            + " volume=" + c2.getVolume());

        // Declare and allocate a new instance of cylinder
        // specifying radius and height, with default color
        Cylinder c3 = new Cylinder(2.0, 10.0);
        System.out.println("Cylinder:"
        + " radius=" + c3.getRadius()
        + " height=" + c3.getHeight()
        + " base area=" + c3.getArea()
        + " volume=" + c3.getVolume());


    }
}
```

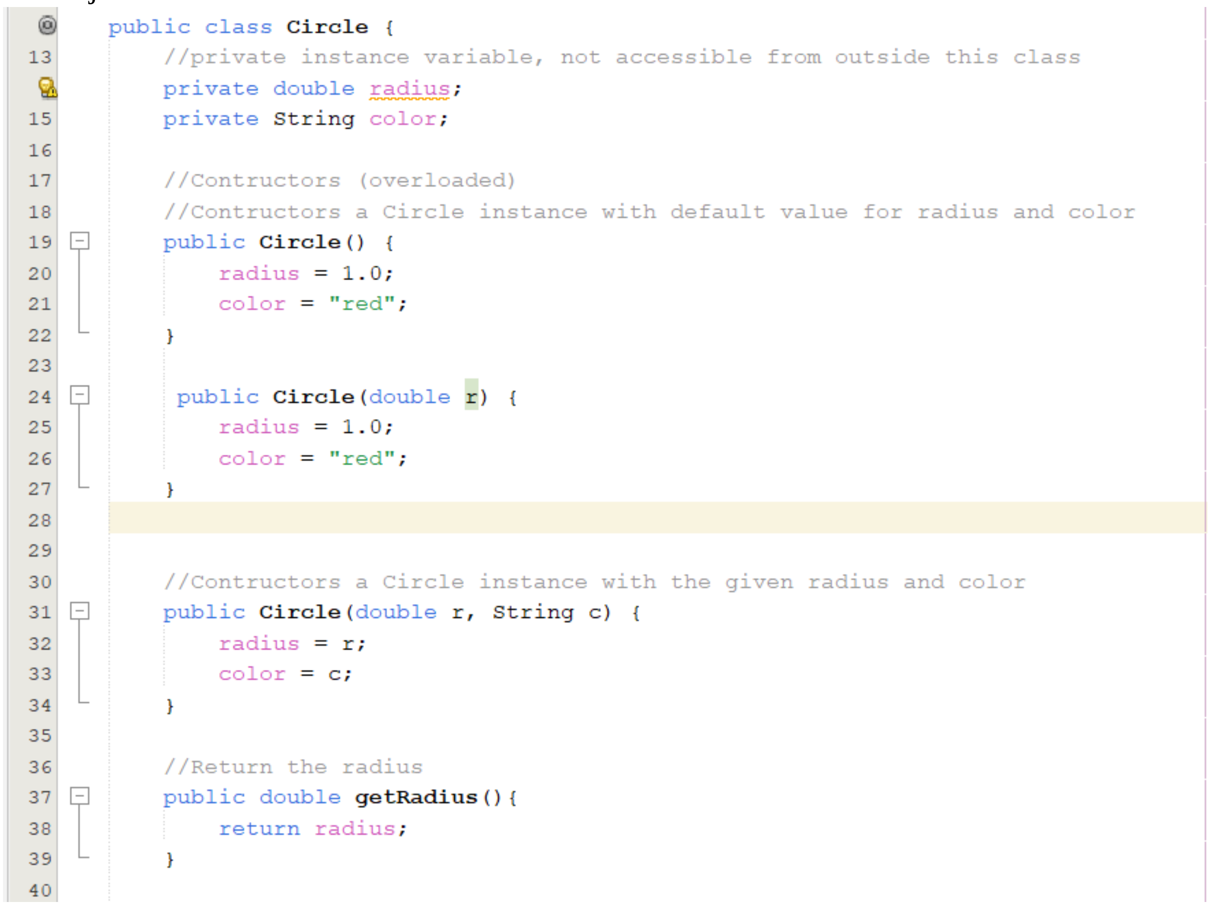
Output



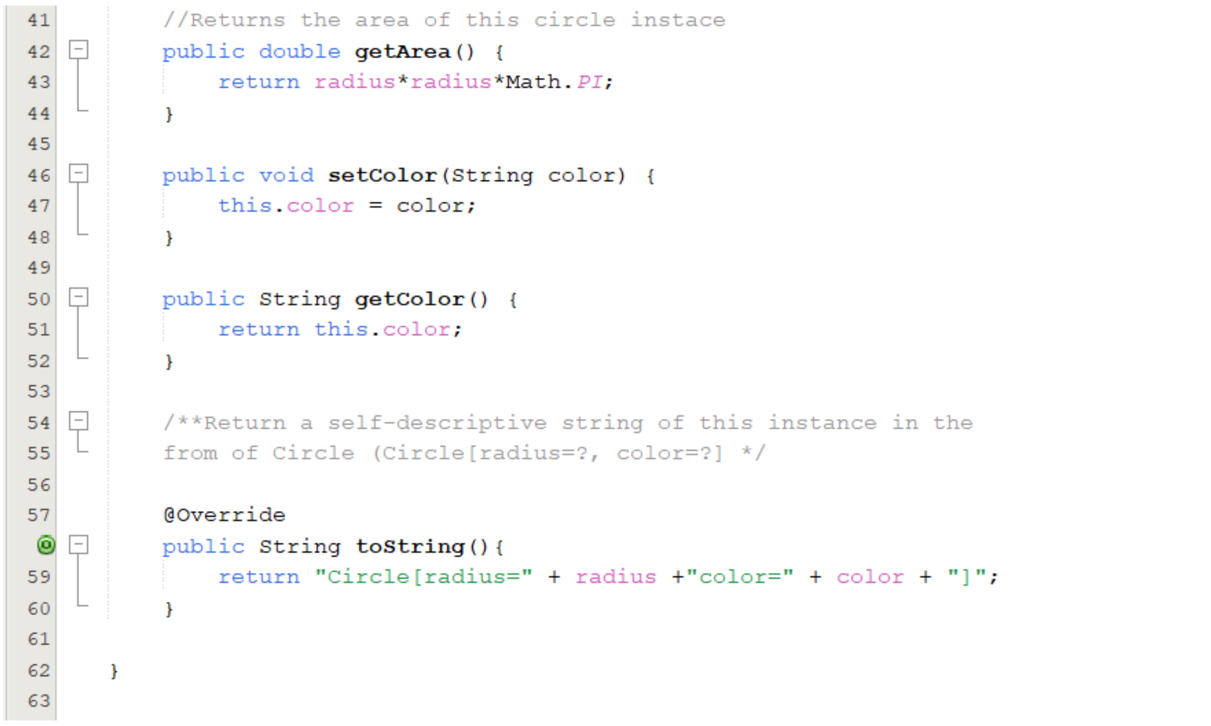
```
run:
Cylinder: radius=1.0 height=1.0 base area=3.141592653589793 volume=3.141592653589793
Cylinder: radius=1.0 height=10.0 base area=3.141592653589793 volume=31.41592653589793
Cylinder: radius=2.0 height=10.0 base area=12.566370614359172 volume=125.66370614359172
BUILD SUCCESSFUL (total time: 0 seconds)
```

2. Source Code yang Dimanipulasi

a) Circle.java

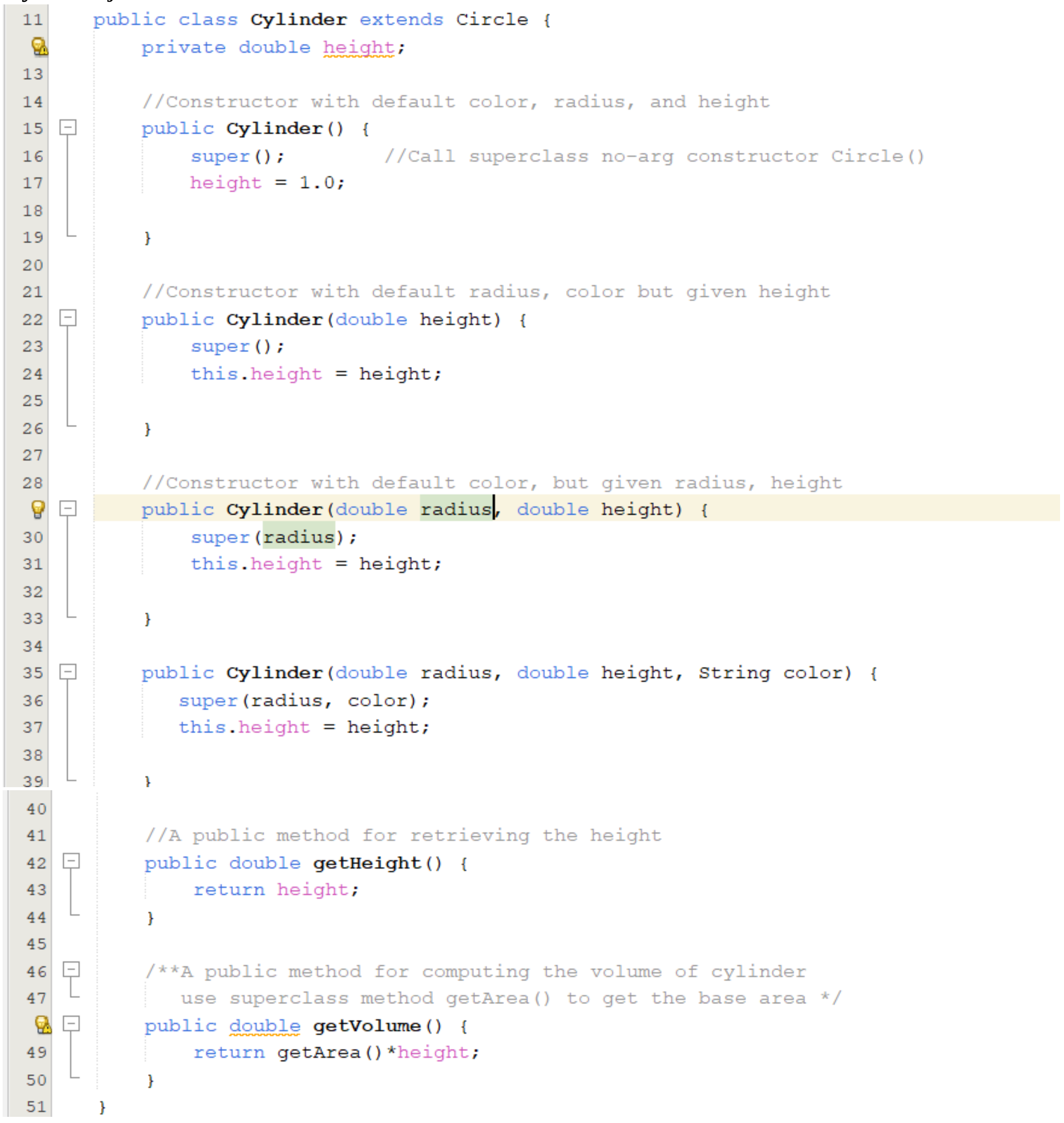


```java
public class Circle {
    //private instance variable, not accessible from outside this class
    private double radius;
    private String color;

    //Contructors (overloaded)
    //Contructors a Circle instance with default value for radius and color
    public Circle() {
        radius = 1.0;
        color = "red";
    }

     public Circle(double r) {
        radius = 1.0;
        color = "red";
    }



    //Contructors a Circle instance with the given radius and color
    public Circle(double r, String c) {
        radius = r;
        color = c;
    }

    //Return the radius
    public double getRadius(){
        return radius;
    }

```



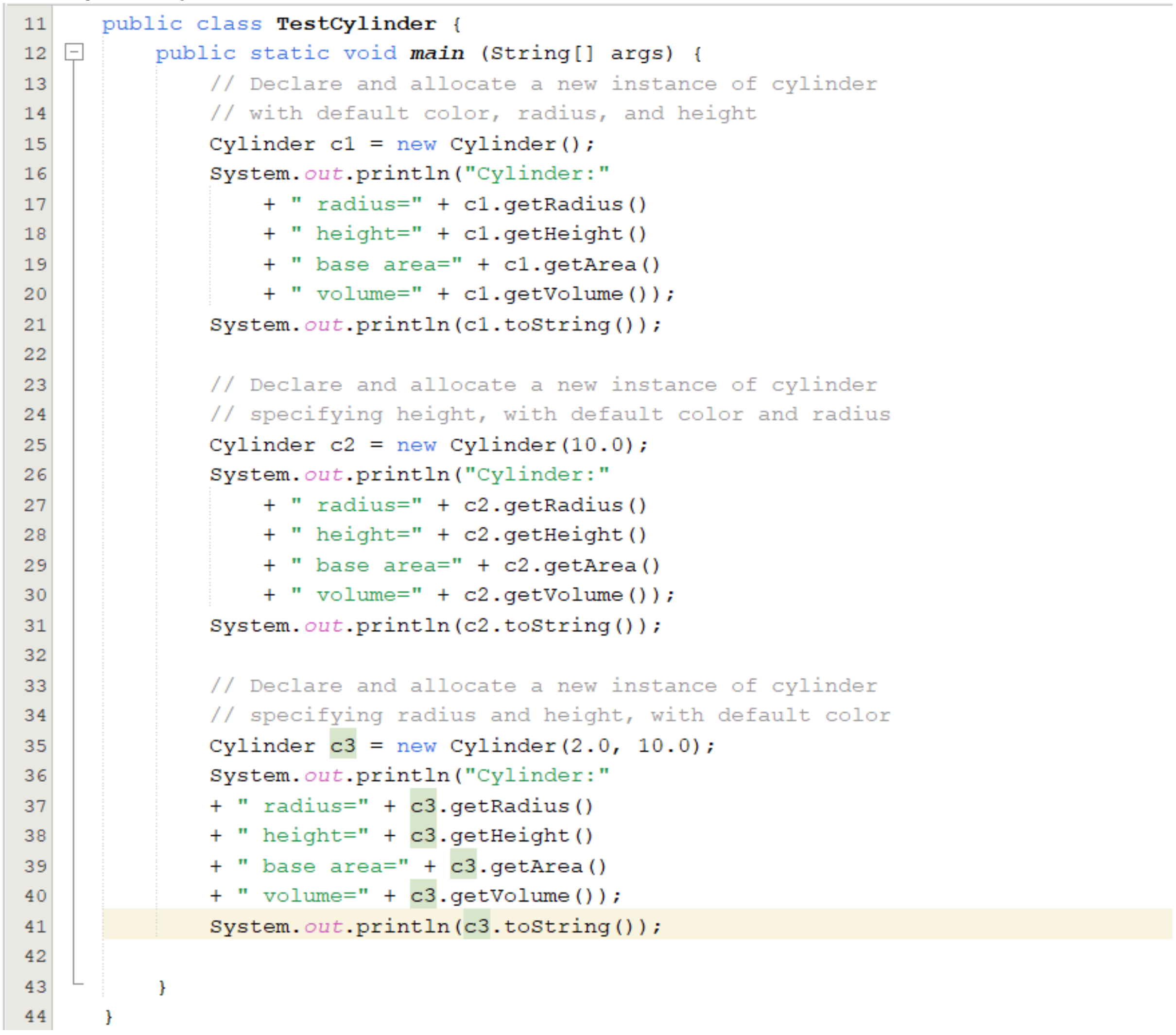
```java
    //Returns the area of this circle instace
    public double getArea() {
        return radius*radius*Math.PI;
    }

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

    public String getColor() {
        return this.color;
    }

    /**Return a self-descriptive string of this instance in the
    from of Circle (Circle[radius=?, color=?] */

    @Override
    public String toString(){
        return "Circle[radius=" + radius +"color=" + color + "]";
    }

}

```

b) Cylinder.java



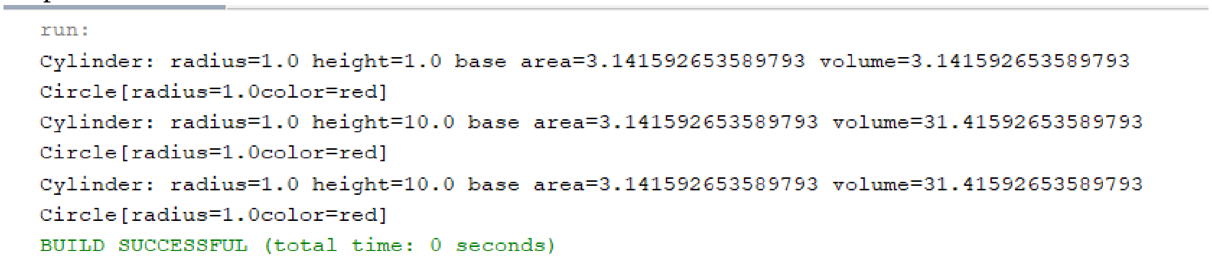
```
public class Cylinder extends Circle {
    private double height;

    //Constructor with default color, radius, and height
    public Cylinder() {
        super();        //Call superclass no-arg constructor Circle()
        height = 1.0;

    }

    //Constructor with default radius, color but given height
    public Cylinder(double height) {
        super();
        this.height = height;

    }

    //Constructor with default color, but given radius, height
    public Cylinder(double radius, double height) {
        super(radius);
        this.height = height;

    }

    public Cylinder(double radius, double height, String color) {
       super(radius, color);
       this.height = height;

    }

    //A public method for retrieving the height
    public double getHeight() {
        return height;
    }

    /**A public method for computing the volume of cylinder
       use superclass method getArea() to get the base area */
    public double getVolume() {
        return getArea()*height;
    }
}
```

c) TestCylinder.java



```java
public class TestCylinder {
    public static void main (String[] args) {
        // Declare and allocate a new instance of cylinder
        // with default color, radius, and height
        Cylinder c1 = new Cylinder();
        System.out.println("Cylinder:"
            + " radius=" + c1.getRadius()
            + " height=" + c1.getHeight()
            + " base area=" + c1.getArea()
            + " volume=" + c1.getVolume());
        System.out.println(c1.toString());

        // Declare and allocate a new instance of cylinder
        // specifying height, with default color and radius
        Cylinder c2 = new Cylinder(10.0);
        System.out.println("Cylinder:"
            + " radius=" + c2.getRadius()
            + " height=" + c2.getHeight()
            + " base area=" + c2.getArea()
            + " volume=" + c2.getVolume());
        System.out.println(c2.toString());

        // Declare and allocate a new instance of cylinder
        // specifying radius and height, with default color
        Cylinder c3 = new Cylinder(2.0, 10.0);
        System.out.println("Cylinder:"
        + " radius=" + c3.getRadius()
        + " height=" + c3.getHeight()
        + " base area=" + c3.getArea()
        + " volume=" + c3.getVolume());
        System.out.println(c3.toString());

    }
}
```

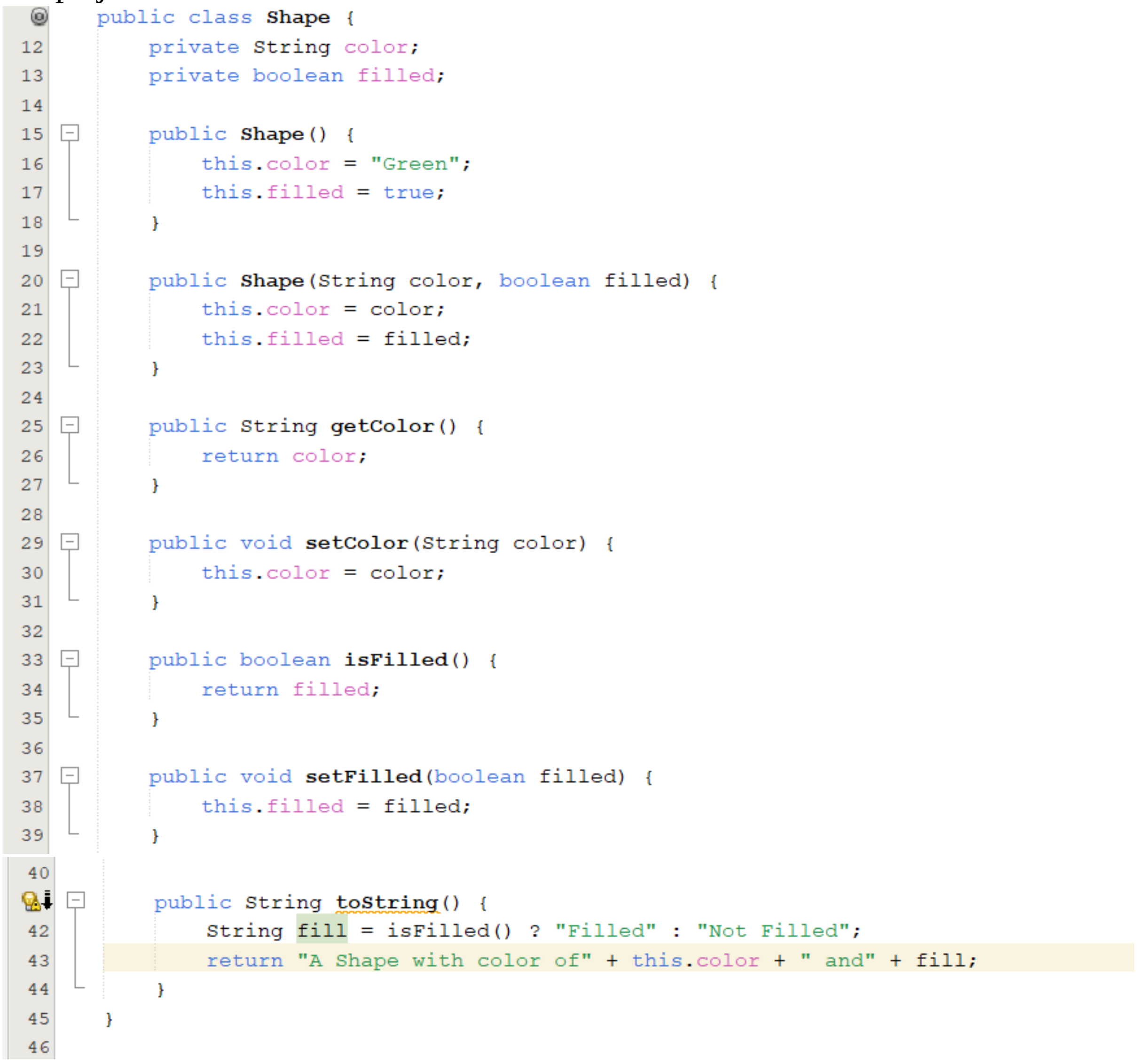
Ouput



```
run:
Cylinder: radius=1.0 height=1.0 base area=3.141592653589793 volume=3.141592653589793
Circle[radius=1.0color=red]
Cylinder: radius=1.0 height=10.0 base area=3.141592653589793 volume=31.41592653589793
Circle[radius=1.0color=red]
Cylinder: radius=1.0 height=10.0 base area=3.141592653589793 volume=31.41592653589793
Circle[radius=1.0color=red]
BUILD SUCCESSFUL (total time: 0 seconds)
```

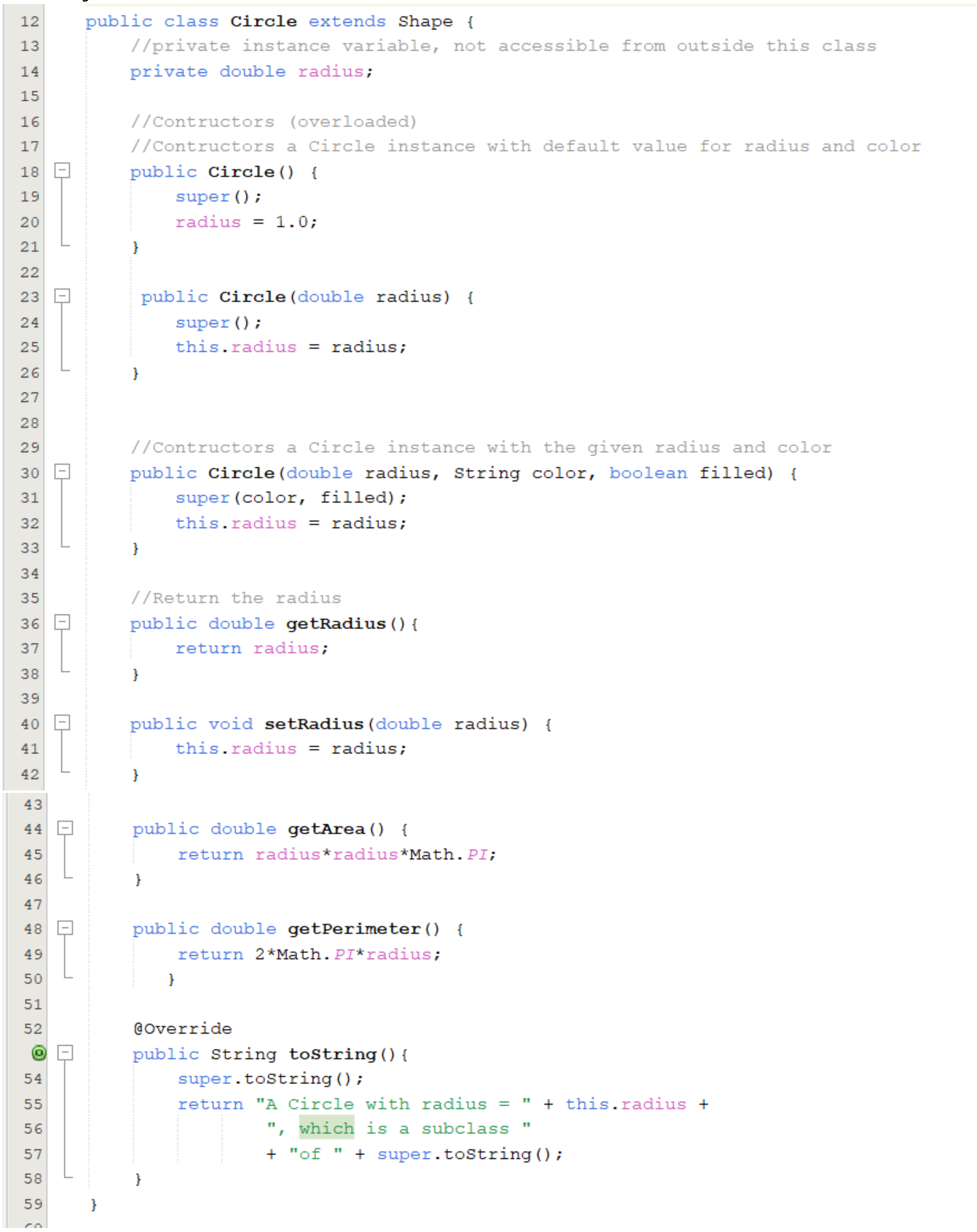
Exercise 2. Superclass Shape and its Subclasses Circle, Rectangle and Square

1. Shape.java



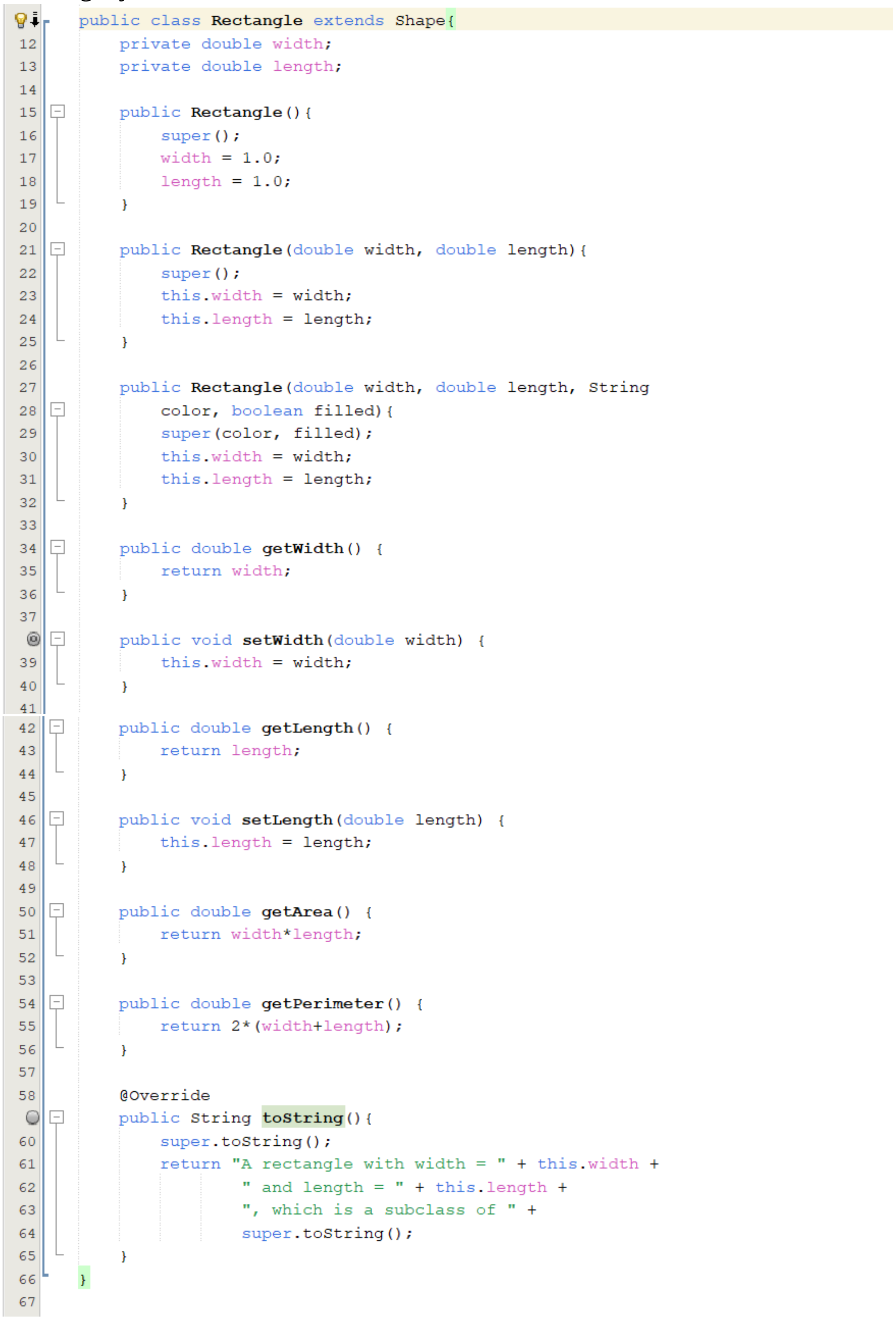
```java
public class Shape {
    private String color;
    private boolean filled;

    public Shape() {
        this.color = "Green";
        this.filled = true;
    }

    public Shape(String color, boolean filled) {
        this.color = color;
        this.filled = filled;
    }

    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 String toString() {
        String fill = isFilled() ? "Filled" : "Not Filled";
        return "A Shape with color of" + this.color + " and" + fill;
    }
}
```

2. Circle.java



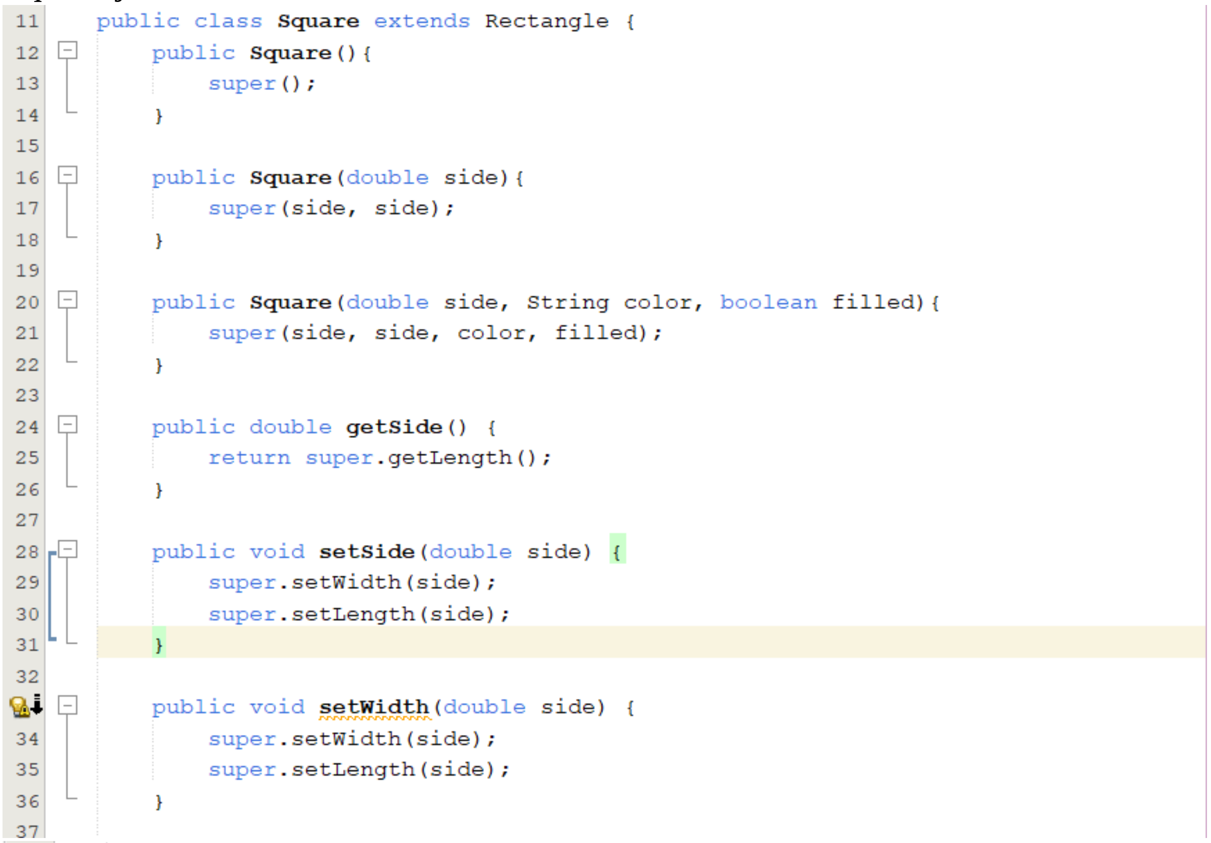
```java
public class Circle extends Shape {
    //private instance variable, not accessible from outside this class
    private double radius;

    //Contructors (overloaded)
    //Contructors a Circle instance with default value for radius and color
    public Circle() {
        super();
        radius = 1.0;
    }

     public Circle(double radius) {
        super();
        this.radius = radius;
    }


    //Contructors a Circle instance with the given radius and color
    public Circle(double radius, String color, boolean filled) {
        super(color, filled);
        this.radius = radius;
    }

    //Return the radius
    public double getRadius(){
        return radius;
    }

    public void setRadius(double radius) {
        this.radius = radius;
    }

    public double getArea() {
        return radius*radius*Math.PI;
    }

    public double getPerimeter() {
        return 2*Math.PI*radius;
       }

    @Override
    public String toString(){
        super.toString();
        return "A Circle with radius = " + this.radius +
                ", which is a subclass "
                + "of " + super.toString();
    }
}
```

3. Rectangle.java

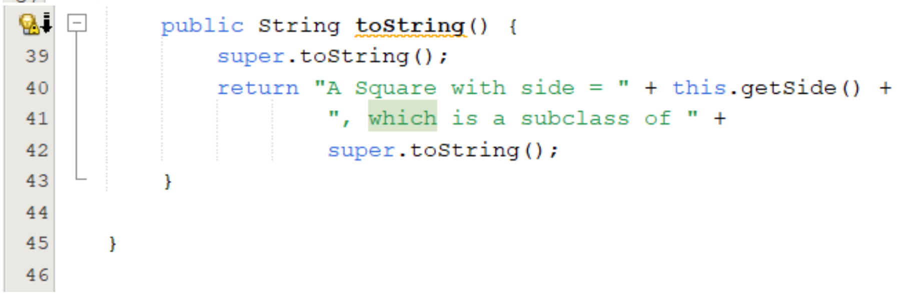


```java
public class Rectangle extends Shape{
    private double width;
    private double length;

    public Rectangle(){
        super();
        width = 1.0;
        length = 1.0;
    }

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

    public Rectangle(double width, double length, String
        color, boolean filled){
        super(color, filled);
        this.width = width;
        this.length = length;
    }

    public double getWidth() {
        return width;
    }

    public void setWidth(double width) {
        this.width = width;
    }

    public double getLength() {
        return length;
    }

    public void setLength(double length) {
        this.length = length;
    }

    public double getArea() {
        return width*length;
    }

    public double getPerimeter() {
        return 2*(width+length);
    }

    @Override
    public String toString(){
        super.toString();
        return "A rectangle with width = " + this.width +
                " and length = " + this.length +
                ", which is a subclass of " +
                super.toString();
    }
}
```

4. Square.java

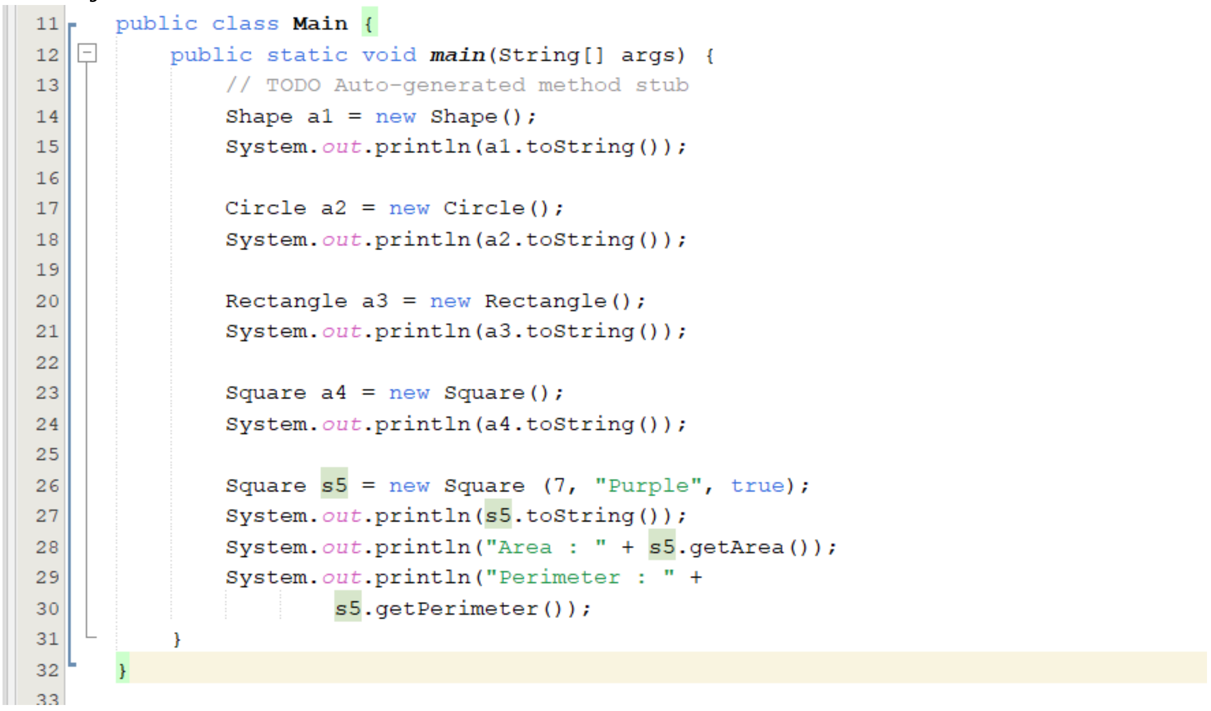


```java
public class Square extends Rectangle {
    public Square(){
        super();
    }

    public Square(double side){
        super(side, side);
    }

    public Square(double side, String color, boolean filled){
        super(side, side, color, filled);
    }

    public double getSide() {
        return super.getLength();
    }

    public void setSide(double side) {
        super.setWidth(side);
        super.setLength(side);
    }

    public void setWidth(double side) {
        super.setWidth(side);
        super.setLength(side);
    }

```



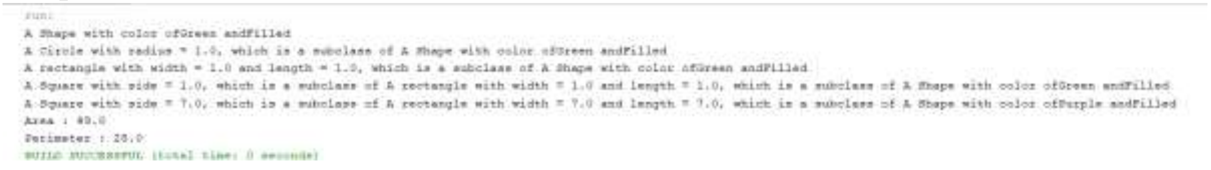
```java
    public String toString() {
        super.toString();
        return "A Square with side = " + this.getSide() +
                ", which is a subclass of " +
                super.toString();
    }

}

```

5. Main.java



```java
public class Main {
    public static void main(String[] args) {
        // TODO Auto-generated method stub
        Shape a1 = new Shape();
        System.out.println(a1.toString());

        Circle a2 = new Circle();
        System.out.println(a2.toString());

        Rectangle a3 = new Rectangle();
        System.out.println(a3.toString());

        Square a4 = new Square();
        System.out.println(a4.toString());

        Square s5 = new Square (7, "Purple", true);
        System.out.println(s5.toString());
        System.out.println("Area : " + s5.getArea());
        System.out.println("Perimeter : " +
                s5.getPerimeter());
    }
}
```

Output



```
run:
A Shape with color ofGreen andFilled
A Circle with radius = 1.0, which is a subclass of A Shape with color ofGreen andFilled
A rectangle with width = 1.0 and length = 1.0, which is a subclass of A Shape with color ofGreen andFilled
A Square with side = 1.0, which is a subclass of A rectangle with width = 1.0 and length = 1.0, which is a subclass of A Shape with color ofGreen andFilled
A Square with side = 7.0, which is a subclass of A rectangle with width = 7.0 and length = 7.0, which is a subclass of A Shape with color ofPurple andFilled
Area : 49.0
Perimeter : 28.0
BUILD SUCCESSFUL (total time: 0 seconds)
```