第九章

程序清单9-1

```
package work4;

public class TestCircle {
    public static void main(String[] args) {
        Circle circle1 = new Circle();
        System.out.println("The area of the circle of radius " + circle1.radius
+ " is " + circle1.getArea());

        Circle circle2 = new Circle(25);
        System.out.println("The area of the circle of radius " + circle2.radius
+ " is " + circle2.getArea());

        Circle circle3 = new Circle(125);
        System.out.println("The area of the circle of radius " + circle3.radius
+ " is " + circle3.getArea());

        circle2.radius = 100;
        System.out.println("The area of the circle of radius " + circle2.radius
+ " is " + circle2.getArea());
    }
}

// Define the circle class with the two constructors
class Circle {
    double radius;

    Circle() {
        radius = 1.0;
    }

    Circle(double newRadius) {
        radius = newRadius;
    }

    double getRadius() {
        return radius;
    }

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

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

    void setRadius(double newRadius) {
        radius = newRadius;
    }
}
```

程序清单9-2

```
package work4;

public class AlternativeCircle {
    public static void main(String[] args) {
        AlternativeCircle circle1 = new AlternativeCircle();
        System.out.println("The area of the circle of radius " + circle1.radius
+ " is " + circle1.getArea());

        AlternativeCircle circle2 = new AlternativeCircle(25);
        System.out.println("The area of the circle of radius " + circle2.radius
+ " is " + circle2.getArea());

        AlternativeCircle circle3 = new AlternativeCircle(125);
        System.out.println("The area of the circle of radius " + circle3.radius
+ " is " + circle3.getArea());

        circle2.radius = 100;
        System.out.println("The area of the circle of radius " + circle2.radius
+ " is " + circle2.getArea());
    }

    double radius;

    AlternativeCircle() {
        radius = 1;
    }

    AlternativeCircle(double newRadius) {
        radius = newRadius;
    }

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

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

    void setRadius(double newRadius) {
        radius = newRadius;
    }
}
```

程序清单9-3

```
package work4;

public class TV {
    int channel = 1;
    int volumeLevel = 1;
```

```
    boolean on = false;

    public TV() {
    }

    public void turnOn() {
        on = true;
    }

    public void turnOff() {
        on = false;
    }

    public void setChannel(int newChannel) {
        if (on && newChannel >= 1 && newChannel <= 120) {
            channel = newChannel;
        }
    }

    public void setVolume(int newVolumeLevel) {
        if (on && newVolumeLevel >= 1 && newVolumeLevel <= 7) {
            volumeLevel = newVolumeLevel;
        }
    }

    public void channelUp() {
        if (on && channel < 120)
            channel++;
    }

    public void channelDown() {
        if (on && channel > 1)
            channel--;
    }

    public void volumeUp() {
        if (on && volumeLevel < 7)
            volumeLevel++;
    }

    public void volumeDown() {
        if (on && volumeLevel > 1)
            volumeLevel--;
    }
}
```

程序清单9-4

```
package work4;

public class TestTV {
    public static void main(String[] args) {
        TV tv1 = new TV();
        tv1.turnOn();
        tv1.setChannel(30);
        tv1.setVolume(3);
```

```
        TV tv2 = new TV();
        tv2.turnOn();
        tv2.channelUp();
        tv2.channelUp();
        tv2.volumeUp();

        System.out.println("tv1's channel is " + tv1.channel + " and volume is "
+ tv1.volumeLevel);
        System.out.println("tv2's channel is " + tv2.channel + " and volume is "
+ tv2.volumeLevel);
    }
}
```

程序清单9-5

```
package work4;

import java.util.Scanner;

public class TestPoint2D {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);

        System.out.print("Enter point1's x-, y-coordinates: ");
        double x1 = input.nextDouble();
        double y1 = input.nextDouble();
        System.out.print("Enter point2's x-, y-coordinates: ");
        double x2 = input.nextDouble();
        double y2 = input.nextDouble();

        Point2D p1 = new Point2D(x1, y1);
        Point2D p2 = new Point2D(x2, y2);
        System.out.println("p1 is " + p1.toString());
        System.out.println("p2 is " + p2.toString());
        System.out.println("The distance between p1 and p2 is " +
p1.distance(p2));
        System.out.println("The midpoint between p1 and p2 is " +
p1.midpoint(p2).toString());

        input.close();
    }

}
```

程序清单9-6

```
package work4;

public class CircleWithStaticMembers {
    double radius;
    static int numberOfObjects = 0;

    CircleWithStaticMembers() {
```

```
        radius = 1;
        numberOfObjects++;
    }

    CircleWithStaticMembers(double newRadius) {
        radius = newRadius;
        numberOfObjects++;
    }

    static int getNumberOfObjects() {
        return numberOfObjects;
    }

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

程序清单9-7

```
package work4;

public class TestCircleWithStaticMembers {
    public static void main(String[] args) {
        System.out.println("Before creating objects");
        System.out.println("The number of Circle objects is " +
CircleWithStaticMembers.numberOfObjects);

        CircleWithStaticMembers c1 = new CircleWithStaticMembers();
        System.out.println("\nAfter creating c1");
        System.out.println("c1: radius (" + c1.radius + ") and number of Circle
objects is (" + c1.numberOfObjects + ")");

        CircleWithStaticMembers c2 = new CircleWithStaticMembers(5);

        c1.radius = 9;

        System.out.println("\nAfter creating c2 and modifying c1");
        System.out.println("c1: radius (" + c1.radius + ") and number of Circle
objects is (" + c1.numberOfObjects + ")");
        System.out.println("c2: radius (" + c2.radius + ") and number of Circle
objects is (" + c2.numberOfObjects + ")");
    }
}
```

程序清单9-8

```
package work4;

public class CircleWithPrivateDataFields {
    private double radius = 1;
    private static int numberOfObjects = 0;

    public CircleWithPrivateDataFields() {
```

```
        numberOfObjects++;
    }

    public CircleWithPrivateDataFields(double newRadius) {
        radius = newRadius;
        numberOfObjects++;
    }

    public double getRadius() {
        return radius;
    }

    public void setRadius(double newRadius) {
        radius = (newRadius >= 0) ? newRadius : 0;
    }

    public static int getNumberOfObjects() {
        return numberOfObjects;
    }

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

程序清单9-9

```
package work4;

public class TestCircleWithPrivateDataFields {
    public static void main(String[] args) {
        CircleWithPrivateDataFields myCircle = new
CircleWithPrivateDataFields(5.0);
        System.out.println("The area of the circle of radius " +
myCircle.getRadius() + " is " + myCircle.getArea());

        myCircle.setRadius(myCircle.getRadius() * 1.1);
        System.out.println("The area of the circle of radius " +
myCircle.getRadius() + " is " + myCircle.getArea());

        System.out.println("The number of objects created is " +
CircleWithPrivateDataFields.getNumberOfObjects());

    }
}
```

程序清单9-10

```
package work4;

public class TestPassObject {
    public static void main(String[] args) {
        Circle myCircle = new Circle(1);
```

```
        int n = 5;
        printAreas(myCircle, n);

        System.out.println("\n" + "Radius is " + myCircle.getRadius());
        System.out.println("n is " + n);
    }

    public static void printAreas(Circle c, int times) {
        System.out.println("Radius \t\tArea");
        while (times >= 1) {
            System.out.println(c.getRadius() + "\t\t" + c.getArea());
            c.setRadius(c.getRadius() + 1);
            times--;
        }
    }
}
```

程序清单9-11

```
package work4;

public class TotalArea {
    public static void main(String[] args) {
        Circle[] circleArray;

        circleArray = createCircleArray();

        printCircleArray(circleArray);
    }

    public static Circle[] createCircleArray() {
        Circle[] circleArray = new Circle[5];
        for (int i = 0; i < circleArray.length; i++) {
            circleArray[i] = new Circle(Math.random() * 100);
        }
        return circleArray;
    }

    public static void printCircleArray(Circle[] circleArray) {
        System.out.printf("%-30s%-50s\n", "Radius", "Area");
        for (int i = 0; i < circleArray.length; i++) {
            System.out.printf("%-30f%-15f\n", circleArray[i].getRadius(),
circleArray[i].getArea());
        }
        System.out.println("-----------------------------------------");
        System.out.printf("%-30s%-15f\n", "The total area of circle is",
sum(circleArray));
    }

    public static double sum(Circle[] circleArray) {
        double sum = 0;
        for (int i = 0; i < circleArray.length; i++) {
            sum += circleArray[i].getArea();
        }
        return sum;
    }
```

```
}
```