1. Create a class named **Circle** with the following attributes:

* A double attribute named **radius**.
* A String attribute named **color**.

The class should have a **constructor** that initializes both radius and color.

Implement **getter** and **setter** methods for both radius and color.

Implement a method double **getArea**() that returns the area of the circle. Use Math.PI \* radius \* radius to calculate the area.

Implement a method double **getCircumference**() that returns the circumference of the circle. Use 2 \* Math.PI \* radius.

Implement a **toString** method that returns a string representation of a circle object.

1. Create another class called **CircleCollection** with the following attributes:

* An **array of Circle objects**.

The CircleCollection class should have **two constructors**:

* One that takes the capacity to create an empty array of that size
* And another that takes an array of Circle objects to initialize the collection.

Implement a **getter and a setter** for the array attribute.

Implement a method void **addCircle**(Circle c, int index) that adds a circle to a specified index in the array.

Implement a method Circle **getCircle**(int index) that returns the circle at a given index.

Implement a method int **getTotalCircles**() that returns the total number of non-null circles in the array.

Implement a method double **getTotalArea**() that returns the total area of all non-null circles in the array. (*Use for each for the loop*)

Implement a **toString** method that returns a string representation of all objects in the array.

1. **Test Your Implementation**

Create a third class with a **main** method to test your Circle and CircleCollection classes.

Create 4 Circle instances.

Create a circle collection object called myCollection using the second constructor.

Use the CircleCollection methods to print:

* The total area of all circles.
* The second circle.
* All circle objects in myCollection array

Answer:

package circlecollection;

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\* @author enas

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public class Circle {

private double radius;

private String color;

// Constructor to initialize radius and color

public Circle(double radius, String color) {

this.radius = radius;

this.color = color;

}

public double getRadius() {

return radius;

}

public void setRadius(double radius) {

this.radius = radius;

}

public String getColor() {

return color;

}

public void setColor(String color) {

this.color = color;

}

public double getArea() {

return Math.PI \* radius \* radius;

}

public double getCircumference() {

return 2 \* Math.PI \* radius;

}

@Override

public String toString() {

return "Circle(radius: " + radius + ", color: " + color + ")";

}

}

package circlecollection;

import java.util.Arrays;

/\*\*

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\* @author enas

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class CircleCollection {

private Circle[] circles;

// Constructor to create an empty collection with a specified capacity

public CircleCollection(int capacity) {

circles = new Circle[capacity];

}

// Constructor to initialize the collection with an array of circles

public CircleCollection(Circle[] circles) {

this.circles = circles;

}

public void addCircle(Circle c, int index) {

if (index >= 0 && index < circles.length)

{circles[index] = c;

}

else {

System.out.println("Index out of bounds.");

}

}

public Circle getCircle(int index) {

if (index >= 0 && index < circles.length) {

return circles[index];

}

return null; // Return null if the index is out of bounds

}

// Method to get the total number of circles

public int getTotalCircles() {

int count = 0;

for(int i = 0; i< circles.length;i++)

{

if(circles[i]!=null)

count++;

}

return count;

}

// Method to get the total area of all non-null circles

public double getTotalArea() {

double totalArea = 0;

for(Circle c : circles)

{

if(c!=null)

totalArea += c.getArea();

}

return totalArea;

}

@Override

public String toString() {

return Arrays.toString(circles);

}

}

/\*

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\*/

package circlecollection;

/\*\*

\*

\* @author Owner

\*/

public class Test {

public static void main(String[] args) {

Circle c1 = new Circle(3.5, "red");

Circle c2 = new Circle(5, "white");

Circle c3 = new Circle(5.5, "black");

Circle c4 = new Circle(6, "Green");

Circle[] myCircles= {c1,c2,c3,c4};

CircleCollection myCollection = new CircleCollection(myCircles);

System.out.println("total areas = " +myCollection.getTotalArea());

System.out.println("second circle: "+ myCollection.getCircle(1));

System.out.println(myCollection);

}

}