Java Circe's Circle Calculator

Contents

Time required: 90 minutes

Please read the directions carefully before beginning the assignment.

- Comment each line of code as shown in the tutorials and other code examples.
- Follow all directions carefully and accurately.
- Think of the directions as minimum requirements.

Pseudocode or TODO

1. Write pseudocode or TODO for the exercise.
2. Comment your code to show evidence of understanding.

Requirements

In the world of ancient Greek mythology, Circe was not just a goddess but also a Python programmer with a passion for circles. During her divine duties, she crafted a circle calculator using her coding skills, which pulsated with enchantment. This magical tool unlocked circle secrets like circumferences and diameters, blending her Pythonic magic with mathematical elegance. Circe's circle calculator became famous among gods and mortals, symbolizing the fusion of her mystical coding and mathematical mastery, a bridge between the digital and divine.

She loves circles because it is so close to her name! She would like you to create a circle calculator for her to use whenever she takes a break from being a goddess.

This program will ask the user to enter the radius of a circle. Calculate and display the circle's diameter, area, and circumference.

1. Create a Java program named **CircleCalculator.java**
2. Create a creative program title.
3. Ask the user for the radius of a circle, get as double.
4. Calculate the diameter. Diameter of a circle: **d = 2r**
5. Calculate the area. Area of a circle: **a = πr²**
6. Calculate the circumference. Circumference of a circle: **c = 2πr**
7. Display the user input, diameter, area, and circumference.

Convert Math Formula to Java Code

The following is an example of how to convert math formulas to Java code.

```
# Diameter of a circle: d = 2r
double diameter;
double radius;
diameter = 2.0 * radius

# Area of a circle: a = πr2
double area;
area = Math.PI * (radius * radius)

# Circumference of a circle: c = 2πr
double circumference;
circumference = (2.0 * Math.PI) * radius
```

Java Rounding

There are several methods to round doubles in Java. This is a short example using Math.round. Math.round rounds any float to an integer. We can do some simple math to make this work.

```
public class RoundingExample {
    public static void main(String[] args) {
        double number = 42.562178;
        double roundedDouble;
        // Round the double to two decimal places
        roundedDouble = Math.round(number * 100.0) / 100.0;

        // Print the rounded double
        System.out.println("Rounded Number: " + roundedDouble);
    }
}
```

Example run:

```
Rounded Number: 42.56
```

In this example, we multiply the original double by 100.0, round it to the nearest integer using **Math.round.** Then divide the result by 100.0 to obtain a double with two decimal places.

To round to a different number of decimal places, replace 100.0 with the appropriate number. For example, to round to one decimal place, use 10.0.

pi Constant

Some programming languages have a built-in constant for commonly used numbers. In Java, you can access the mathematical constant **π** (pi) using the **Math.PI** constant. It represents the value of pi (approximately 3.141592653589793).

Example of pi in use:

```
public class PiExample {
    public static void main(String[] args) {
        double pi = Math.PI;
        System.out.println("The value of pi is approximately: " + pi);
    }
}
```

Example run:

```
The value of pi is approximately: 3.141592653589793
```

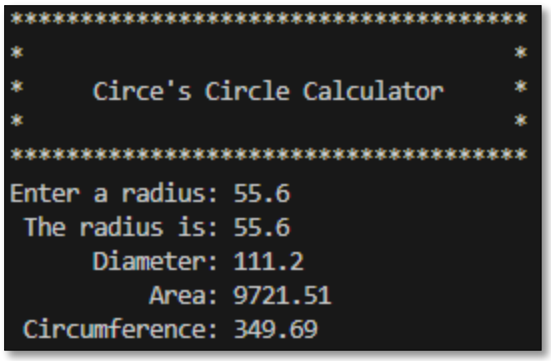
TODO Outline of Program

You can use the following TODO outline to get started with your program.

```
/*
 * Filename: CircleCalculator.java
 * Written by:
 * Written on:
 * Calculate diameter, area, and circumference of a circle
 */
// TODO: Declare constants and variables

// TODO: Print creative program title

// TODO: Get user input for radius as double

// TODO: Calculate diameter of circle
// formula: d = 2r, where r = radius

// TODO: Calculate area of circle
// formula: a = πr2, where r = radius

// TODO: Calculate circumference of circle
// formula: c = 2πr, where r = radius

// TODO: Echo user input, Display results
```

Example run:

```
**************************************
*                                    *
*     Circe's Circle Calculator      *
*                                    *
**************************************
Enter a radius: 12.1
 The radius is: 12.1
     Diameter: 24.2
         Area: 460.42
 Circumference: 76.1
```



Assignment Submission

1. Use pseudocode or TODO.
2. Comment your code to show evidence of understanding.
3. Attach the program files.
4. Attach screenshots showing the successful operation of the program.
5. Submit in Blackboard.