**CS 140 Lab 7 (10 points)**

**Lab Objectives**

Be able to write methods, Be able to call methods, Be able to comment on Java methods

**Task #1 void Methods**

1. Copy and save the code listing attached at the end of Lab 7 as *Geometry.java*. This program will compile, but, when you run it, it doesn’t appear to do anything except wait. That is because it is waiting for user input, but the user doesn’t have the menu to choose from yet. We will need to create this.

2. Below the main method, but in the Geometry class, create a static method called printMenu that has no parameter list and does not return a value. It will simply print out instructions for the user with a menu of options for the user to choose from. The menu should appear to the user as:

This is a geometry calculator

Choose what you would like to calculate

(1) Find the area of a circle

(2) Find the area of a rectangle

(3) Find the circumference of a circle

(4) Find the perimeter of a rectangle

Enter the number of your choice:

3. Add a line in the main method that calls the printMenu method as indicated by the comments.

4. Compile, debug, and run. You should be able to choose any option, but you will always get 0 for the answer. We will fix this in task#2.

**Task #2 Value-Returning Methods**

1. Write a static method called **circleArea** that takes in the radius of the circle and returns the area using the formula A = π *r* 2.

2. Write a static method called **rectangleArea** that takes in the length and width of the rectangle and returns the area using the formula A = *lw*.

3. Write a static method called **circleCircumference** that takes in the radius of the circle and returns the circumference using the formula C = *2*π*r*.

4. Write a static method called **rectanglePerimeter** that takes in the length and the width of the rectangle and returns the perimeter of the rectangle using the formula P = 2*l* +2*w*.

(Note: for π you may use predefined constant in math library Math.PI)

**Task #3 Calling Methods**

1. Add lines in the main method in the GeometryDemo class which will call these methods. The comments indicate where to place the method calls.

2. **Below, write some sample data and hand calculated results for you to test all 4 menu items.**

(for example, r = 3.0, circle area should be about 28.27, circle circumference about 18.85; w = 2.0, l=3.0, rectangle area should be 6.0, circumference 10.0)

3. Compile, debug, and run. Test out the program using your sample data.

**Task #4 Java Documentation**

1. Write comments for each of the static methods you just wrote.

They should include:

a. A one line summary of what the method does.

b. A description of what the program requires to operate and what the result of that operation is.

c. @param listing and describing each of the parameters in the parameter list (if any).

d. @return describing the information that is returned to the calling statement (if any).

Note: use of Java doc is optinal

**Code Listing (Geometry.java)**

import java.util.Scanner;

//This program demonstrates static methods

public class Geometry

{

public static void main(String[] args)

{

int choice; // The user's choice

double value = 0; // The method's return value

char letter; // The user's Y or N decision

double radius; // The radius of the circle

double length; // The length of the rectangle

double width; // The width of the rectangle

// Create a scanner object to read from the keyboard

Scanner keyboard = new Scanner(System.in);

// The do loop allows the menu to be displayed first

do

{

// TASK #1 Call the printMenu method

choice = keyboard.nextInt();

switch (choice)

{

case 1:

System.out.print("Enter the radius of " + "the circle: ");

radius = keyboard.nextDouble();

// TASK #3 Call the circleArea method and

// store the result in the value variable

System.out.println("The area of the " + "circle is " + value);

break;

case 2:

System.out.print("Enter the length of " + "the rectangle: ");

length = keyboard.nextDouble();

System.out.print("Enter the width of " + "the rectangle: ");

width = keyboard.nextDouble();

// TASK #3 Call the rectangleArea method and

// store the result in the value variable

System.out.println("The area of the " + "rectangle is " + value);

break;

case 3:

System.out.print("Enter the radius of " + "the circle: ");

radius = keyboard.nextDouble();

// TASK #3 Call the circumference method and

// store the result in the value variable

System.out.println("The circumference " + "of the circle is " + value);

break;

case 4:

System.out.print("Enter the length of " + "the rectangle: ");

length = keyboard.nextDouble();

System.out.print("Enter the width of " + "the rectangle: ");

width = keyboard.nextDouble();

// TASK #3 Call the perimeter method and

// store the result in the value variable

System.out.println("The perimeter of " + "the rectangle is " + value);

break;

default:

System.out.println("You did not enter " + "a valid choice.");

}

keyboard.nextLine(); // Consume the new line

System.out.println("Do you want to exit " + "the program (Y/N)?: ");

String answer = keyboard.nextLine();

letter = answer.charAt(0);

} while(letter != 'Y' && letter != 'y');

}

// TASK #1 Create the printMenu method here

// TASK #2 Create the value-returning methods here

}

// TASK #4 Write comments for each method

**Testing requirement:** each case including the default case must be tested twice and create a script file to capture all test runs. Copy and paste the test results captured on script file to the end of your source code (i.e. the .java file) and use block comments (/\* … \*/ ) to comment out the test results.

**Submission requirement:** submit the source code (.java file with test results attached at the end of the program as block comment) on blackboard along the Lab 7 link.