Rajalakshmi Engineering College

Name: Udhayakrishna K G
Email: 241801302@rajalakshmi.edu.in
Roll no: 241801302
Phone: 9994814568
Branch: REC
Department: AI & DS - Section 4
Batch: 2028
Degree: B.E - AI & DS

Scan to verify results

2024_28_III_OOPS Using Java Lab

REC_2028_OOPS using Java_Week 6_CY

Attempt : 1
Total Mark : 40
Marks Obtained : 40

Section 1 : Coding

1. Problem Statement

A painter needs to determine the cost to paint different shapes based on their surface area. The program should be designed to handle the area of a sphere and calculate the total painting cost using the following formulas:

Area of sphere: Area = 4 * pi * r^2 where pi = 3.14Total painting cost: Cost = cost per square meter * area of sphere

The program will consist of three classes:

Shape class: This class should set the shape type and radius.Area class: This class should extend Shape to calculate the area.Cost class: This class should extend Area to calculate the total painting cost.

Input Format

The input consists of a string representing the shape type, a double value representing the radius, and another double value representing the cost per square meter on each line.

Output Format

For a valid shape type of "Sphere":

- The first line prints: "Area of Sphere is: <calculated_area>" rounded to two decimal places.
- The second line prints: "Cost to paint the shape is: <total_painting_cost>" rounded to two decimal places.

For any other shape types, print: "Invalid type".

Refer to the sample output for formatting specifications.

Sample Test Case

Input: Sphere
3.4
5.8

Output: Area of Sphere is: 145.19
Cost to paint the shape is: 842.12

Answer

```
import java.util.Scanner;

// You are using Java
class Cost {
   String s;
   Scanner sc;
   double cost;
   double r;
   public Cost() {

   }

   public void setShape(String s, Scanner sc) {
      this.s = s.trim();
      this.sc = sc;
      if (!s.equals("Sphere")) {
            System.out.println("Invalid type");
        }
    }

    public void setCost(double cost) {
        this.cost = cost;
    }

    public void calculateArea() {
        if (!s.equals("Sphere")) {
            return;
        }
        r = sc.nextDouble();
    }

    public void calculateCost() {
        if (!s.equals("Sphere")) {
            return;
        }
        System.out.printf("Area of Sphere is: %.2f\n", (4*3.14*cost*cost));
        System.out.printf("Cost to paint the shape is: %.2f", (4*3.14*cost*cost*r));
    }
}

public class Main {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        String s = scanner.next();
        Cost shape = new Cost();
        shape.setShape(s, scanner);
        double costToPaint = scanner.nextDouble();
        shape.calculateArea();
        shape.setCost(costToPaint);
        shape.calculateCost();
    }
}
```

Status : Correct ***Marks : 10/10***

2. Problem Statement

Bob has been tasked with creating a program using CircleUtils class to calculate and display the circumference and area of the circle.

The program should allow Bob to input the radius of a circle as both an integer and a double and compute both the circumference and area of the circle using separate overloaded methods:

calculateCircumference- To calculate the circumference using the formula 2 * 3.14 * radiuscalculateArea- To calculate the area 3.14 * radius * radius

Write a program to help Bob.

Input Format

The first line of input consists of an integer m, representing the radius of the circle as a whole number.

The second line consists of a double value n, representing the radius of the circle as a decimal number.

Output Format

The first line of output displays two space-separated double values, rounded to two decimal places, representing the circumference of the circle with the integer radius and the double radius, respectively.

The second line displays two space-separated double values, rounded to two decimal places, representing the area of the circle with the integer radius and the double radius, respectively.

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 5
3.50

Output: 31.40 21.98
78.50 38.47

Answer

```
import java.util.Scanner;
```

```
// You are using Java
class CircleUtils {
    public double calculateCircumference(int radius) {
        return 2*3.14*radius;
    }
    public double calculateCircumference(double radius) {
        return 2*3.14*radius;
    }
    public double calculateArea(int radius) {
        return 3.14*radius*radius;
    }
    public double calculateArea(double radius) {
        return 3.14*radius*radius;
    }


}

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

        int radiusInt = scanner.nextInt();
        double radiusDouble = scanner.nextDouble();

        CircleUtils circleUtils = new CircleUtils();

        double circumferenceInt = circleUtils.calculateCircumference(radiusInt);
        double circumferenceDouble =
circleUtils.calculateCircumference(radiusDouble);
        double areaInt = circleUtils.calculateArea(radiusInt);
        double areaDouble = circleUtils.calculateArea(radiusDouble);

        System.out.format("%.2f %.2f\n", circumferenceInt, circumferenceDouble);
        System.out.format("%.2f %.2f", areaInt, areaDouble);

        scanner.close();
    }
}
```

Status : Correct ***Marks : 10/10***

3. Problem Statement

Mary is managing a business and wants to analyze its profitability. She operates both a regular business model and a seasonal business model. To assess profitability, she uses a program that calculates and compares the profit margins for both models based on revenue and cost.

The program defines:

BusinessUtility class with a method calculateMargin(double revenue, double cost).SeasonalBusinessUtility (inherits from BusinessUtility) and overrides calculateMargin(double revenue, double cost), adding a seasonal adjustment of 10% to the base margin.ProfitabilityChecker class with a method checkProfitability(double regularMargin), which prints "Business is profitable." if the regular margin is 10% or more, otherwise prints "Business is not profitable.".

Mary inputs revenue and cost, and the program compute and display the regular and seasonal margins using:

Margin = ((Revenue − Cost) / Revenue) × 100

Seasonal Margin = Margin + 10

Input Format

The first line of input consists of a double value r, representing the revenue.

The second line consists of a double value c, representing the cost.

Output Format

The first line prints a double value, representing the regular profit margin, rounded to two decimal places, in the format: "Regular Margin: X. XX%", where X.XX denotes the calculated regular margin.

The second line prints a double value, representing the seasonal profit margin, rounded to two decimal places, in the format: "Seasonal Margin: X. XX%", where X.XX denotes the calculated seasonal margin.

The third line prints a string, indicating whether the business is profitable or not profitable, based on the regular margin.

If the regular margin is less than 10, print "Business is not profitable.". If it is 10 or greater, print "Business is profitable."

Refer to the sample output for the formatting specifications.

Sample Test Case

Input: 1000.0
800.0

Output: Regular Margin: 20.00%
Seasonal Margin: 30.00%
Business is profitable.

Answer

```
import java.util.Scanner;

// You are using Java
class BusinessUtility {
   public BusinessUtility() {

   }
   public double calculateMargin(double rev, double cost) {
      return ((rev-cost)/rev)*100;
   }
}
class SeasonalBusinessUtility extends BusinessUtility {
   public SeasonalBusinessUtility() {

   }
   public double calculateMargin(double rev, double cost) {
      return (((rev-cost)/rev)*100)+10;
   }
}



class ProfitabilityChecker{
   public void checkProfitability(double regularMargin) {
      System.out.println("Business is " + ((regularMargin < 10) ? "not " : "") +
"profitable.");
```

```
    }
}
class Main {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        double revenue = scanner.nextDouble();
        double cost = scanner.nextDouble();
        BusinessUtility business = new BusinessUtility();
        SeasonalBusinessUtility seasonalBusiness = new 
SeasonalBusinessUtility();
        double regularMargin = business.calculateMargin(revenue, cost);
        double seasonalMargin = seasonalBusiness.calculateMargin(revenue, 
cost);

        System.out.printf("Regular Margin: %.2f%%\n", regularMargin);
        System.out.printf("Seasonal Margin: %.2f%%\n", seasonalMargin);

        ProfitabilityChecker checker = new ProfitabilityChecker();
        checker.checkProfitability(regularMargin);
        scanner.close();
    }
}
```

Status : Correct ***Marks : 10/10***

4. Problem Statement

Teena's retail store has implemented a Loyalty Points System to reward customers based on their spending. The program calculates and displays the loyalty points based on whether the customer is a regular or a premium customer.

For regular customers (class Customer), the loyalty points are calculated as:

Loyalty points = amount spent / 10

For premium customers (class PremiumCustomer, which inherits from Customer), the loyalty points are calculated as:

Loyalty points = 2 * (amount spent / 10)

The program should use method overriding for premium customers to calculate their loyalty points. The method that needs to be overridden is calculateLoyaltyPoints in the Customer class.

Input Format

The first line of input consists of an integer representing the amount spent by the customer.

The second line consists of a string representing the premium customer status:

- "yes" if the customer is a premium customer.
- "no" if the customer is not a premium customer.

Output Format

The output should display the loyalty points earned based on the amount spent and the customer type.

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 50
yes

Output: 10

Answer

```
import java.util.Scanner;

// You are using Java
class Customer {
   public Customer() {

   }

   public int calculateLoyaltyPoints(int amountSpent) {
      return (amountSpent/10);
   }
}
```

```
class PremiumCustomer extends Customer {

    public PremiumCustomer() {

    }

    public int calculateLoyaltyPoints(int amountSpent) {
        return 2*(amountSpent/10);
    }
}

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

        int amountSpent = scanner.nextInt();

        String isPremium = scanner.next().toLowerCase();

        Customer customer;

        if (isPremium.equals("yes")) {
            customer = new PremiumCustomer();
        } else {
            customer = new Customer();
        }

        int loyaltyPoints = customer.calculateLoyaltyPoints(amountSpent);

        System.out.println(loyaltyPoints);
    }
}
```

Status : Correct ***Marks : 10/10***