Q1) Describe abstract class called Shape which has three subclasses say Triangle, Rectangle, Circle. Define one method area() in the abstract class and override this area() in these three subclasses to calculate for specific object, i.e., area() of Triangle subclass should calculate area of triangle etc. Same for Rectangle and Circle.

Ans:

**Program:**

package Exp\_5;

import java.util.Scanner;

import java.lang.Math;

abstract class Shape{

    double a,b;

    Shape(){}

    abstract double area();

}

class Triangle extends Shape{

    double a,b,c;

    Triangle(double a, double b, double c){

        this.a = a;

        this.b = b;

        this.c = c;

    }

    double area(){

        double s = (a+b+c)/2;

        return Math.sqrt(s\*(s-a)\*(s-b)\*(s-c));

    }

}

class Rectangle extends Shape{

    double a,b;

    Rectangle(double a,double b){

        this.a = a;

        this.b = b;

    }

    double area(){

        return a\*b;

    }

}

class Circle extends Shape{

    double r;

    Circle(double r){

        this.r = r;

    }

    double area(){

        return Math.PI\*r\*r;

    }

}

public class First {

    public static void main(String[] args) {

        Scanner sc = new Scanner(System.in);

        System.out.print("Enter dimensions of triangle: ");

        Triangle t = new Triangle(sc.nextDouble(),sc.nextDouble() ,sc.nextDouble() );

        System.out.println("Area: "+t.area());

        System.out.print("Enter dimensions of rectangle: ");

        Rectangle r = new Rectangle(sc.nextDouble() ,sc.nextDouble() );

        System.out.println("Area: "+r.area());

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

        Circle c = new Circle(sc.nextDouble() );

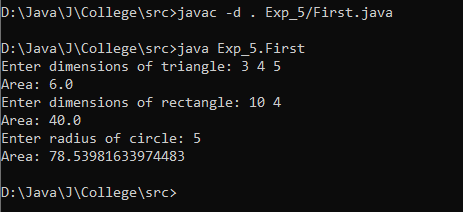
        System.out.println("Area: "+c.area());

        sc.close();

    }

}

**Output:**



Q2) Write a program that demonstrates the instance of operator. Declare interfaces I1 and I2. Interface I3 extends both of these interfaces. Also declare interface I4. Class X implements I3. Class W extends X and implements I4. Create an object of class W. Use the instance of operator to test if that object implements each of the interfaces and is of type X.

Ans:

**Program:**

package Exp\_5;

interface I1{}

interface I2{}

interface I3 extends I1,I2{}

class X implements I3{

}

interface I4{}

class W extends X implements I4{}

public class Second {

    public static void main(String[] args) {

        W w = new W();

        System.out.println(w instanceof W);

        System.out.println(w instanceof X);

        System.out.println(w instanceof I1);

        System.out.println(w instanceof I2);

        System.out.println(w instanceof I3);

        System.out.println(w instanceof I4);

    }

}

**Output:**

A computer screen with white text

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Q3) Write a java program to implement an interface called Exam with a method Pass (int mark) that returns a boolean. Write another interface called Classify with a method Division (int average) which returns a String. Write a class called Result which implements both Exam and Classify. The Pass method should return true if the mark is greater than or equal to 50 else false. The Division method must return "First" when the parameter average is 60 or more, "Second" when average is 50 or more but below 60, "No division" when average is less than 50.

Ans:

**Program:**

package Exp\_5;

interface Exam{

    boolean Pass(int marks);

}

interface Classify{

    String Divide(int average);

}

class Result implements Exam,Classify{

    public boolean Pass(int marks){

        if(marks>40) return true;

        else return false;

    }

    public String Divide(int average){

        if(average>60) return "First";

        else if (average>50 && average<60 ) return "Second";

        else return "No division";

    }

}

public class Third {

    public static void main(String[] args) {

        Result r = new Result();

        System.out.println(r.Pass(50));

        System.out.println(r.Divide(90));

    }

}

**Output:**

A black screen with white text

AI-generated content may be incorrect.