Inheritance Program

50 points

Write a program that contains classes for Quadrilateral, Trapezoid, Parallelogram, Rectangle and Square. Create and use a Point class to represent the points in each shape.

Point class: This class contains an x and y variable to represent coordinates. Create a custom constructor that accepts the coordinates, getters for each and a toString method.

Quadrilateral class: This class contains four variables, which are each points. The constructor will accept 4 sets of coordinates and create points for these coordinates and assign the points to the instance variables. Create getters for the four points and a toString. In addition, create a method named getCoordinatesAsString which formats the coordinates which will be called by the toString method.

Trapezoid class: This class inherits from Quadrilateral.

Instance variable:

* height

Methods:

* Constructor: accepts the four sets of coordinates that will then be passed to the Quadrilateral constructor.
* getHeight()- This method calculates the height based on the y coordinates of two points.
* getSumOfTwoSides()- This method determines the length of two sides and returns the sum of these two lengths
* getArea()- This method calculates the area of the trapezoid by calling the getSumOfTwoSides and multiplying that result by height divided by 2
* toString

Parallelogram class: This class inherits from Trapezoid

* No instance variables
* Constructor accepts the 4 sets of coordinates to pass to the super class
* getWidth()- This method calculates the width based on the x coordinates of two points
* toString

Rectangle class: This class inherits from Parallelogram

* No instance variables
* Constructor that accepts the 4 sets of coordinates to pass to the super class
* toString method

Square class: This class inherits from Parallelogram

* Constructor that accepts the 4 sets of coordinates to pass to the super class
* toString method

Rectangle class: This class inherits from Parallelogram- Create a constructor and a toString

Driver: Create one instance of each type of object: Quadrilateral, Trapezoid, Parallelogram, Rectangle, Square and then output each, calling the toString().

Sample output:

Coordinates of Quadrilateral are:

(1.1, 1.2), (6.6, 2.8), (6.2, 9.9), (2.2, 7.4)

Coordinates of Trapezoid are:

(0.0, 0.0), (10.0, 0.0), (8.0, 5.0), (3.3, 5.0)

Height is: 5.0

Area is: 36.75

Coordinates of Parallelogram are:

(5.0, 5.0), (11.0, 5.0), (12.0, 20.0), (6.0, 20.0)

Width is: 6.0

Height is: 15.0

Area is: 90.0

Coordinates of Rectangle are:

(17.0, 14.0), (30.0, 14.0), (30.0, 28.0), (17.0, 28.0)

Width is: 13.0

Height is: 14.0

Area is: 182.0

Coordinates of Square are:

(4.0, 0.0), (8.0, 0.0), (8.0, 4.0), (4.0, 4.0)

Side is: 4.0

Area is: 16.0

Grading Criteria:

5 points- quadrilateral creates four points in constructor

5 points- quadrilateral has two methods for output- one to format the string and then the toString calls the format method

10 points- classes use inheritance properly- in constructors, method header and toString

5 points- parallelogram calculates width

5 points- trapezoid calculates width

10 points- trapezoid calculates area

10 points- Correct instantiation and output of objects