**Name**

**Advanced Programming in Java**

**Lab Exercise 12/16/2024**

1. A class MyRectangle represents a rectangle with its horizontal and vertical sides positioned at integer coordinates (assume x increases to right and y increases toward top:

public class MyRectangle

{

private int top, bottom, left, right;

...

}

a. If top < bottom or left > right then the rectangle is empty. Fill in the blanks in the boolean method isEmpty that returns true if this rectangle is empty and false otherwise:

public boolean isEmpty()

{

return \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ;

}

b. Write a boolean method isInside that returns true if this rectangle is not empty and a given point (*x*, *y*) lies inside it or on the border, and false otherwise:

public boolean isInside(int x, int y)

{

...

}

c. Write a boolean method isInside that returns true if a circle with the center at (*x*, *y*) and radius *r* lies inside this rectangle, and false otherwise:

public boolean isInside(int x, int y, int r)

{

...

}

d. Write a constructor with four arguments representing the positions of its sides:

public MyRectangle(int l, int r, int t, int b)

If l > r or t < b then the rectangle is empty. Use the isEmpty( ) method to determine this. If the rectangle is empty, then set all sides to 0. If the rectangle is not empty, set the sides to l, r, t, and b.

e. Write a copy constructor:

public MyRectangle(MyRectangle other)

1. Write a RectangleTest class that will adequately test the Rectangle class methods in parts a – e.

**Note: it will be easier to test if you make a toString method for the MyRectangle class.**

2. A “Be Prepared” test prep book costs $15.95; “Next Best” costs $21.95. A site apzone.com offers a special deal: both for $35.95. If you buy three or more copies (in any mix of these two titles), they are $13.95 each. If you buy 12 or more copies, you pay only $12.75 for each.

a. Write a method

public static double getOrderTotal(int bp, int nb)

{

...

}

that calculates the total for an order of bp copies of “Be Prepared” and nb copies of “Next Best,” taking into account the above specials.

b. Test your method in a class with a main method that prompts the user for two integers representing the quantities of “Be Prepared” and “Next Best” books desired, and displays the total cost.

3. A class SoccerTeam has fields that represent the number of wins, losses, and ties for this team in the current tournament.

a. Write a method

public void played(SoccerTeam other, int myScore, int otherScore)

that compares the number of goals scored in a game by this and other teams and increments the appropriate fields (wins, losses, ties) in both teams.

b. Write a method that returns the team’s current number of points (each win is two points, each tie is one point).

c. Write a reset method that zeroes out this team’s wins, losses, and ties.

d. Add static fields to keep track of the total number of games played and the total number of goals scored by all teams in a tournament. Modify the played method from Part (a) to update these fields. Add static accessor methods for these fields and a static startTournament method to zero them out.

e. Write a program that defines three teams, makes them play a few games with each other, then reports each team’s points as well as the total number of games played and the total number of goals scored by all teams in the tournament. The program then repeats this for another tournament.

4. Is This a Right Angled Triangle?

Given three numbers, x, y and z, determine whether they are the edges of a right-angled triangle.

Examples

rightTriangle(3, 4, 5) ➞ true

// This is the classic example of a "nice" right angled triangle.

rightTriangle(145, 105, 100) ➞ true

// This is a less famous example.

rightTriangle(70, 130, 110) ➞ false

// This isn't a right angled triangle.

Notes

Notice the largest side of the triangle might not be the last one passed to the function.

All numbers will be integers (whole numbers).

For questions 1 – 4, submit your source code. Each program is to contain the following documentation:

// Author Name

// Program Number (i.e. Lab Exercise 1.4.2018 Problem 2)

// Program Title

// Date