CSE1322L Assignment 1

Define the following three classes:

1) Circle
    a) Must have a private attribute called radius of type double.
    b) Must have a constructor which takes a single parameter of type double. It should set the class attribute radius to this value.
    c) Must have a method called circumference, which takes no parameters, and returns a double. The circumference of a circle is calculated by multiplying 2 * Pi * radius. Note: both Java and C# have a constant called Math.PI which is equal to Pi.
    d) Must have a method called area, which takes no parameters and returns a double. The area of a circle is calculated by multiplying Pi * radius^2. The Math class in both Java and C# have a method for calculating one number raised to a power. You'll need to look up this method and use it to raise the radius to the second power.

2) Triangle
    a) Must have 3 private attributes to hold side1, side2 and side3. Each of which should be of type double.
    b) Must have a constructor that takes in 3 parameters and sets the 3 attributes
    c) Must have an overloaded constructor that takes no parameters and sets the 3 attributes to sizes 3, 4 and 5.
    d) Must have a method called perimeter which takes in no parameters and returns a double. The perimeter of a triangle is calculated by adding side1+side2+side3
    e) Must have a method called area which takes no parameters and returns a double. The area of a triangle is calculated as follows (You'll need to look up the square root function in the Math object in Java or C#):
        i) Calculate p=(side1+side2+side3)/2
        ii) Take the square root of (p*(p-side1)*(p-side2)*(p-side3)).
    f) Must have a method called height which takes no parameters and returns a double. The height of a triangle is calculated as follows:
        i) Find the smallest of the 3 sides (side1, side2 or side3)
        ii) Multiple the area of the triangle by 2, then divide that by the smallest side.
    g) Override the toString/ToString method in this class. Have it return a string that gives the details of the triangle. For example: "Triangle has sides x, y

and z. It has an area of X and perimeter of Y".

3) Rectangle
    a) Must have 2 private attributes height and width. Both of which should be of type double.
    b) Must have a constructor which takes in 2 parameters and sets the 2 attributes of the class
    c) Must have a method called perimeter which takes no parameters and returns a double. The perimeter of a rectangle is calculated by adding 2*height + 2*width
    d) Must have a method called area which takes no parameters and returns a double. The area of a rectangle is calculated by multiplying the height by the width.

Create a driver program which does the following:

1) Using a loop print out the area and circumference of circles with radius 1, 2, 3 … 9, 10. Here is what the first line should look like:

   Area of a circle with radius 1 is 3.14159265358979 circumference is 6.28318530717959

2) Using nested loops, print out the area and perimeter of rectangles with width 1, 2 and 3 and heights 1, 2, and 3. ie, you'll print out the area and perimeter for a rectangle 1x1, 1x2, 1x3, 2x1, 2x2, 2x3, 3x1, 3x2, and 3x3. The first line should look like:

   Area of a rectangle 1 by 1 is 1 it's perimeter is 4

3) Create a triangle with sides 18, 30 and 24. Calculate its area, perimeter and height and print them as follows:

   Area of a triangle 18x30x24 is 216 it's perimeter is 72 and it's height is 24

4) Create a triangle of sides 3, 4, 5 by calling the constructor with no parameters. Calculate its area, perimeter and height and print like the one above.

Submitting your answer:

Please follow the posted submission guidelines here:
https://ccse.kennesaw.edu/fye/submissionguidelines.php

Ensure you submit before the deadline listed on the lab schedule for CSE1322L here: https://ccse.kennesaw.edu/fye/courseschedules.php

Rubric:

Circle class (25 points total):

- Radius Attribute type double/float (4 points total)
  - Type double/float (1 point)
  - Defined Private (3 points)
- Constructor (7 points total)
  - Takes in a parameter of type double/float (3 points)
  - Sets the radius (2 points)
- Method Circumference (7 points total)
  - Takes no parameters (1 point)
  - Correctly calculates circumference (3 points)
  - Correctly returns a double (3 points)
- Method Area (7 points total)
  - Takes no parameters (1 point)
  - Correctly calculates circumference (3 points)
  - Correctly returns a double (3 points)

Triangle Class (35 points total):

- Side1/Side2/Side3 attributes (4 points total)
  - Type double/float (1 point each)
  - Defined private (1 point)
- Default Constructor (3 points total)
  - Sets 3 attributes (1 point each)
- Overloaded Constructor (6 points total)
  - Takes in 3 parameters of type float (1 point each)
  - Sets 3 attributes (1 point each)
- Method perimeter (4 points total)
  - Correctly calculates perimeter (2 points)
  - Correctly returns a double/float (2 points)
- Method area (7 points total)
  - Correctly calculate p (2 points)
  - Correctly calculates area (4 points)
  - Correctly returns double/float (1 point)
- Method height (7 points total)
  - Finding smallest side (4 points)
  - Correctly calculates area (2 points)

    - Correctly returns double/float (1 point)
- ToString override (4 points total)
    - Correctly returns a string (2 points)
    - Returns correct string (2 points)

Rectangle Class (18 points total):

- Height and Width attributes (4 points total)
    - Should be of type double (1 point each)
    - Should be private (1 point each)
- Constructor (4 points total)
    - Take in 2 parameters (2 points)
    - Set the 2 attributes (2 points)
- Method perimeter (5 points total)
    - Correctly calculates the perimeter (3 points)
    - Correctly returns a double (2 points)
- Method area (5 points total)
    - Correctly calculates the area (3 points)
    - Correctly returns a double (2 points)

Driver class/program (22 points total):

- Print area of a circle with radius 1-9 (4 points total)
- Print circumference of circle with radius 1-9 (4 points total)
- Print area of rectangles 1x1, 1x2, 1x3 … 3x1, 3x2, 3x3 (4 points total)
- Print perimeter of rectangles 1x1, 1x2, 1x3 … 3x1, 3x2, 3x3 (4 points total)
- Print area, perimeter and height of triangle 18x30x24 (3 points total)
- Print area, perimeter and height of triangle 3x4x5 (3 points total)