Department of Computer Science
The City College of CUNY

CSc 22100: Software Design Laboratory [Spring 2020]

Exercise 1

A printed report showing [1] *the problem,* [2] *solution methods,* [3] *codes developed, and* [4] *outputs produced for the assignment indicated is due during and/or before the end of the class on Thursday*, 5 March 2020. ***The deadline is strictly observed***.

1- Create a hierarchy of Java classes as follows:

MyLine *is_a* MyShape;
MyPolygon *is_a* MyShape;
MyCircle *is_a* MyShape.

Class MyShape:

Class MyShapeis the hierarchy's superclass and inherits the Java class Object. An implementation of the class defines a point (x, y) and the color of the shape. The class includes appropriate class constructors and methods, including methods that perform the following operations:

a. *getX, getY, getColor* – returns the point (x, y) and color of the MyShape object;
b. *setX, setY, setColor*– sets the point (x, y) and color for the MyShape object;
c. *toString*– returns the object's description as a String. This method must be overridden in each subclass in the hierarchy.
d. *draw*– draws a MyShape object. This method must be overridden in each subclass in the hierarchy. For the MyShape object, it paints the drawing canvas in the color specified.

Class MyLine:

Class MyLine inherits class MyShape. The MyLine object is a straight line defined by the endpoints (x_1, y_1) and (x_2, y_2). The MyLine object may be of any color. The class includes appropriate class constructors and methods that perform the following operations:

a. *getLength* — returns the length of the MyLine object;
b. *get_xAngle*— return the angle (in degrees) of the MyLine object with the x-axis;
c. *toString*— returns a string representation of the MyLine object: length and angle with the x-axis;
d. *draw*— draws a MyLine object whose end points are (x_1, y_1) and (x_2, y_2).

Class MyPolygon:

Class MyPolygon inherits class MyShape. The MyPolygon object is a *regular* polygon defined by the integer parameter, *N*— the number of the polygon's equal side lengths and equal interior angles, and the radius, *r*, in which it is inscribed. The MyPolygon object may be filled with a color. The class includes appropriate class constructors and methods that perform the following operations:

e. *getArea*— returns the area of the MyPolygon object;
f. *getPerimeter*— returns the perimeter of the MyPolygon object;
g. *getAngle*— return the interior angle (in degrees) of the MyPolygon object;
h. *getSide*— returns the side length of the MyPolygon object;
i. *toString*— returns a string representation of the MyPolygon object: side length, interior angle, perimeter, and area;
j. *draw*— draws a MyPolygon object whose center point (*x*, *y*) is defined in class MyShape and inscribed in a circle of radius *r*.

Class MyCircle:

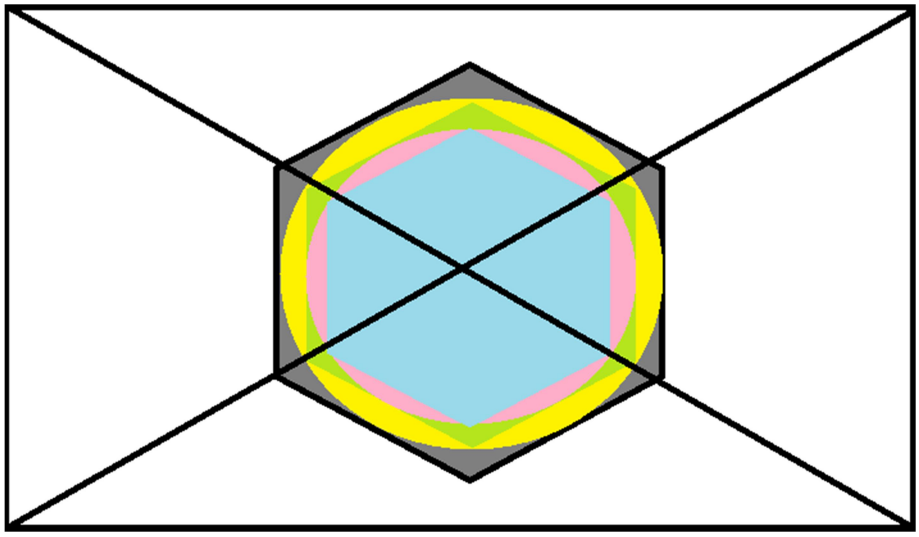
Class MyCircle inherits class MyShape. The MyCircle object is defined by its radius, *r*, and center (*x*, *y*), and may be filled with a color. The MyCircle class includes appropriate class constructors and methods that perform the following operations:

a. *getArea*— returns the area of the MyCircle object;
b. *getPerimeter*— returns the perimeter of the MyCircle object;
c. *getRadius*— returns the radius of the MyCircle object;
d. *toString*— returns a string representation of the MyCircle object: radius, perimeter, and area;
e. *draw*— draws a MyCircle object of radius *r*. The center point (*x*, *y*) of the circle is defined in class MyShape.

2- Use JavaFX graphics and the class hierarchy to draw a geometric configuration comprised of a sequence of alternating concentric circles and their inscribed hexagons as illustrated below, subject to the following additional requirements:

a. The code is applicable to canvases of variable height and width;
b. The dimensions of the shapes are proportional to the smallest dimension of the canvas;
c. The hexagons and circles are filled with different colors of your choice, specified through a MyColor enum class.

Explicitly specify all the classes imported and used in your Java code.



Best wishes

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