CSCI 203: Introduction to Computer Science I
Bucknell University
Computer Science Department
http://www.eg.bucknell.edu/~csci203

Project 3

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1. Problem Description

This project extends the car drawing example seen on pages 112-116 of Big Java.

You will extend the program so that it is possible to scale a car to any size. Your program will also allow someone to specify a car's color.

2. Details

In class, we developed a program that would display a car on the screen. The car was 60 pixels wide and 30 pixels high. When constructing a new car, we specified the (x, y) coordinates of the upper left corner of the car.

Our program consisted of 3 classes.

1. The `CarViewer` class is responsible for producing the frame in which the cars appear.
2. The `CarComponent` class is the component that creates the car objects and asks them to draw themselves.
3. The `Car` class is responsible for creating the cars and drawing them.

You will be making most of your changes in the `Car` class.

2.1. Replace Existing Constructor

Replace the existing constructor in the `Car` class with one that has the following signature.

```
public Car(double x, double y, Color color)
```

The values for x and y are as before. They specify the (x, y) coordinates of the upper left corner of the car. The parameter `color` is the color that you use to draw the car.

2.2. Scaling Constructor

Add another constructor that allows you to specify a car that is scaled. This constructor will have the following signature.

```
public Car(double x, double y, double xScale, double yScale, Color color)
```

Once again, the (x,y) values specify the coordinates of the upper left corner of the car. `xScale` and `yScale` indicate how much to scale the car in the x and y directions respectively. For example, if `xScale` is 2.0 and `yScale` is 3.0, the car will be twice the normal size in the x direction, and three times the normal size in the y direction. Note that if `xScale` and `yScale` are not the same, the tires will no longer be round. This is OK.

The `color` parameter indicates the car's color.

2.3. Shorthand Scaling Constructor

Add a third constructor that allows you to specify that the scaling factor is the same in both directions.

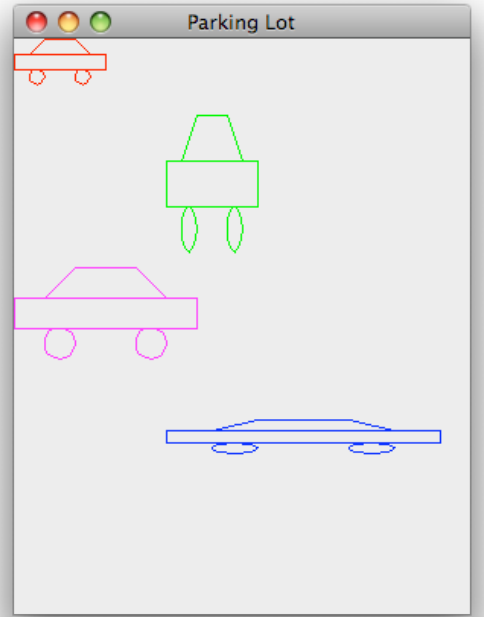
```
public Car(double x, double y, double scale, Color color)
```

This constructor says to create a car whose upper left corner is (x,y), is scaled in *both* the x and y directions by `scale`, and whose color is `color`.

2.4. Example

The following screen shot contains four cars.

1. A red car positioned at $(0,0)$ using the first constructor.
2. A green car positioned at $(100,50)$ using the scaling constructor. The scale factor in the x direction is 1.0 and in the y direction it is 3.0.
3. A magenta car positioned at $(0,150)$ using the shorthand scaling constructor. The scale factor is 2.0.
4. A blue car (stretch limo?) at $(100,250)$ using the scaling constructor. The x scale factor is 3.0, and the y scale factor is 0.75.


Parking Lot

2.5. Other Details

- Your component class should produce the four cars shown in the example. Position them using the coordinates we have provided.
- Add a fifth car using a color and scaling of your choice. Make the window larger if necessary.
- Be sure to include Javadoc comments for *all* methods and constructors.
- Avoid magic numbers!
- The car example we did in class is available on the course web page. On LINUX you can get the files from

  `~csci203/2009-fall/student/projects/proj3`

  You can use these files as a starting point for the project. Don't forget to add your name to the files.

3. What to Submit

Drag your `proj3-xyz01` folder in the the drop box with your instructor's name, *not* the lab drop box.