Data file: test.ppm

In this lab we will add two methods to the Image class that we looked at in class.

At the top of each file, enter a comment with your name, the assignment number, and the date.

When you are finished, export your project from Eclipse and upload it to Canvas.

The **first method** will have the following signature:

public Image getGrayscaleImage()

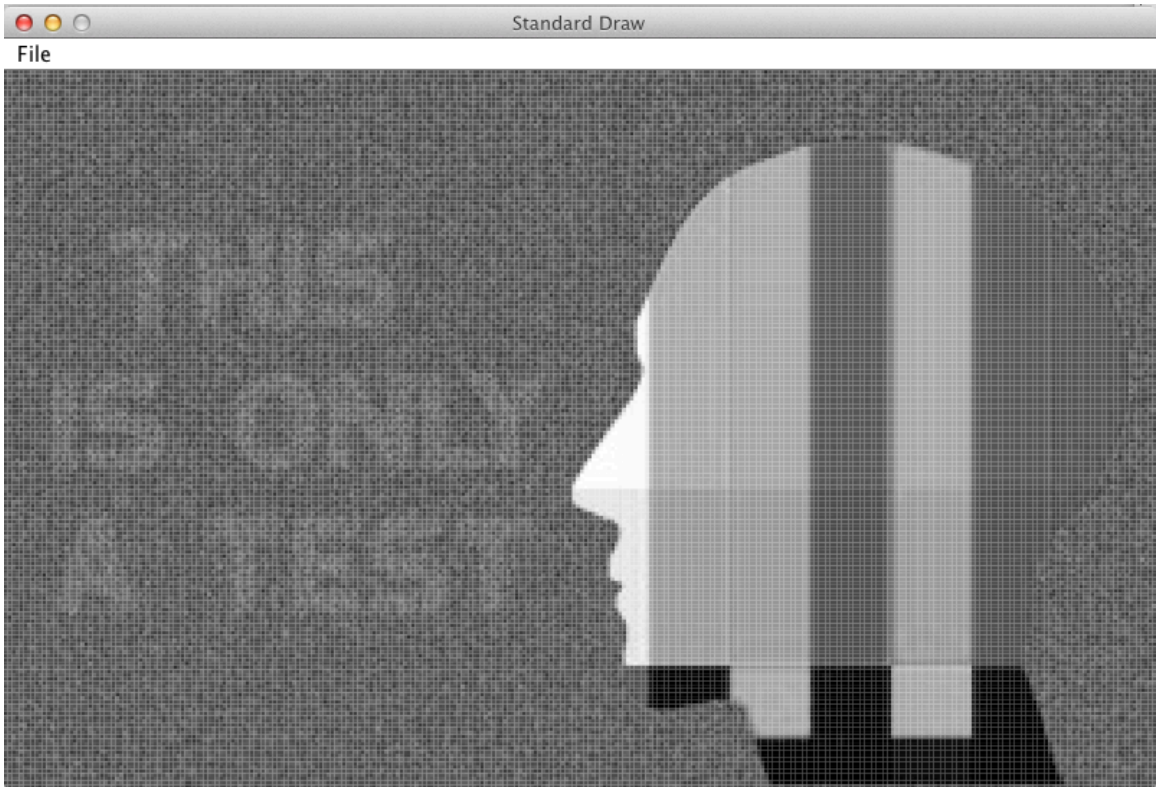
This method should not alter the original image. Rather it should return a new image that is a grayscale version of the original image.

This method should first create a copy of the calling Image object. (Hint: Use the copy constructor we created in class!).

This method should then use the *average* algorithm to create the grayscale image. The average algorithm simply averages the values of the red, green, and blue components of the color. This average is then used for all three components (red, green, blue of the color.

Test this method in your driver program by calling your method and then by drawing the grayscale image that is returned. You can pause between images by using the following code:

```
System.out.println("Press enter to show the grayscale");
keyboard.nextLine();
```



Create a **second method** named getEdgeImage() that performs edge detection on a grayscale image. Once again, this method should not alter the original image but instead should return a new Image.

We will use central differences to estimate the edges:

The intensity (value) of each pixel[i, j] in the new image should be calculated using values from the old image.

This intensity is equal to $\sqrt{{L_x}^2 + {L_y}^2}$ where

$$L_x = -0.5 * L(x-1, y) + 0 * L(x, y) + 0.5 * L(x+1, y)$$

and

$$L_y = -0.5 * L(x, y-1) + 0 * L(x, y) + 0.5 * L(x, y+1)$$

For more information see:
https://en.wikipedia.org/wiki/Edge_detection#Other_first-order_methods

Since the algorithm looks at values in the left, right, upper and lower neighbors of each cell, you should only process the interior cells of the array:

	x	x	x	x	x	x	x	x	
	x	x	x	x	x	x	x	x	
	x	x	x	x	x	x	x	x	
	x	x	x	x	x	x	x	x	
	x	x	x	x	x	x	x	x	
	x	x	x	x	x	x	x	x	
	x	x	x	x	x	x	x	x	
	x	x	x	x	x	x	x	x	

Test this method in your driver program by calling your getEdgeImage method on your grayscale image object. You should draw the image returned by this method.