Google Doc Access Directions:

- Please click on **File** in the upper left corner.
- If you are working on a Chromebook or Google Docs, choose the **Make a copy option** and save a copy of the document to your Google Drive.
- If not, choose the **Download** as option and then the **Microsoft Word (.docx)** option to download an editable copy of the document to your computer.

Using the information you have gained so far, modify the code. Click “Submit Assignment” in the upper right corner of the screen to submit your work. Be sure and save the files as YourNameMod13PictureLabAssignmentSeven

1. Write the method `mirrorVerticalRightToLeft` that mirrors a picture around a mirror placed vertically from right to left. Hint: you can copy the body of `mirrorVertical` and only change one line in the body of the method to accomplish this. Write a class (static) test method called `testMirrorVerticalRightToLeft` in `PictureTester` to test this new method and call it in the `main` method.

```
public static void testMirrorVerticalRightToLeft() {
  Picture beach = new Picture(fileName:"beach.jpg"); // Adjust the filename as necessary
  beach.explore(); // Show the original picture
  beach.mirrorVerticalRightToLeft();
  beach.explore(); // Show the mirrored picture
}
```

```
public void mirrorVerticalRightToLeft() {
  Pixel[][] pixels = this.getPixels2D();
  Pixel leftPixel = null;
  Pixel rightPixel = null;
  int width = pixels[0].length;
  for (int row = 0; row < pixels.length; row++) {
    for (int col = 0; col < width / 2; col++) {
      leftPixel = pixels[row][col];
      rightPixel = pixels[row][width - 1 - col];
      leftPixel.setColor(rightPixel.getColor()); // This line is changed
    }
  }
}
```

2. Write the method `mirrorHorizontal` that mirrors a picture around a mirror placed horizontally at the middle of the height of the picture. Mirror from top to bottom as shown in the pictures below (Figure 8). Write a class (static) test method in `PictureTester` to test this new method and call it in the `main` method.

```
public static void testMirrorHorizontal() {
  Picture beach = new Picture(fileName:"beach.jpg"); // Adjust the filename as necessary
  beach.explore(); // Show the original picture
  beach.mirrorHorizontal();
  beach.explore(); // Show the mirrored picture
}
```

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```
public void mirrorHorizontal() {
  Pixel[][] pixels = this.getPixels2D();
  Pixel topPixel = null;
  Pixel bottomPixel = null;
  int height = pixels.length;
  for (int row = 0; row < height / 2; row++) {
      for (int col = 0; col < pixels[0].length; col++) {
          topPixel = pixels[row][col];
          bottomPixel = pixels[height - 1 - row][col];
          bottomPixel.setColor(topPixel.getColor());
      }
  }
}
```

Figure 8: Original picture (left) and mirrored from top to bottom (right)

Image from AP College Board Picture Lab Student Guide page 15

3. Write the method `mirrorHorizontalBotToTop` that mirrors the picture around a mirror placed horizontally from bottom to top. Hint: you can copy the body of `mirrorHorizontal` and only change one line to accomplish this. Write a class (static) test method in `PictureTester` to test this new method and call it in the `main` method.

```java
public static void testMirrorHorizontalBotToTop() {
  Picture beach = new Picture(fileName:"beach.jpg"); // Adjust the filename as necessary
  beach.explore(); // Show the original picture
  beach.mirrorHorizontalBotToTop();
  beach.explore(); // Show the mirrored picture
}
```

```java
public void mirrorHorizontalBotToTop() {
  Pixel[][] pixels = this.getPixels2D();
  Pixel topPixel = null;
  Pixel bottomPixel = null;
  int height = pixels.length;
  for (int row = 0; row < height / 2; row++) {
      for (int col = 0; col < pixels[0].length; col++) {
          topPixel = pixels[row][col];
          bottomPixel = pixels[height - 1 - row][col];
          topPixel.setColor(bottomPixel.getColor()); // This line is changed
      }
  }
}
```

Line 156:3 Module-Thirteen/pixLab/classes/Picture.java

4. Extra Credit — Work in groups to figure out the algorithm for the method `mirrorDiagonal` that mirrors just a square part of the picture from bottom left to top right around a mirror placed on the diagonal line (the diagonal line is the one where the row index equals the column index). This will copy the triangular area to the left and below the diagonal line as shown below. This is like folding a square piece of paper from the bottom left to the top right, painting just the bottom left triangle and then (while the paint is still wet) folding the paper up to the top right again. The paint would be copied from the bottom left to the top right as shown in the pictures below (Figure 9). Write a class (static) test method in `PictureTester` to test this new method and call it in the `main` method.

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Figure 9: Original picture (left) and mirrored around the diagonal line with copying from bottom left to top right (right)

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