SUMMARY

In this lab you will create a method to perform background replacement.

REPLACE BACKGROUND

Let’s say we have two images; one of a subject in front of a background, and one of just the background. For example, the following two images:

If we traverse the images pixel-by-pixel, we could check each pixel to see if it is similar in both images, or different. The colorDistance method in the Pixel class would be useful here. This would allow us to determine if the pixel is part of the subject or part of the background. Then we could use this to “draw” the subject on a new background (e.g. to the right), effectively replacing the background.

Create the following method:

```java
public Picture replaceBackground(Picture oldBackground,
                                 Picture newBackground,
                                 double threshold)
```

This method will be called on a subject picture, and will take the oldBackground and newBackground as parameters, as well as the threshold for the color distance. Return a new picture that fits within the dimensions of all three (subject, oldBackground, newBackground) that contains the subject on top of the newBackground.
EXAMPLE

```java
Picture subject = new Picture(".../mediasource/chairdog.jpg");
Picture oldBackground = new Picture(".../mediasource/chair.jpg");
Picture newBackground = new Picture(".../mediasource/mars.jpg");
subject.replaceBackground(oldBackground, newBackground, 25.0).show();
```

ANALYZE

The effect is not perfect in the example above. What are the shortcomings?

TEST

Test this lab with your own images. You can use a smartphone to take the pictures. Try to set the camera on a hard surface and don’t move it between shots. For the new background, you can download a photo from the web.

GET CREDIT

Don’t forget to show a coach what you’ve done before you leave so you get credit for attending and participating in the lab.

POST-LAB

If your background is a consistent color, you can also use chroma key to replace the background. Instead of comparing each pixel to the matching pixel in another image, test each pixel for a color distance from a key color.