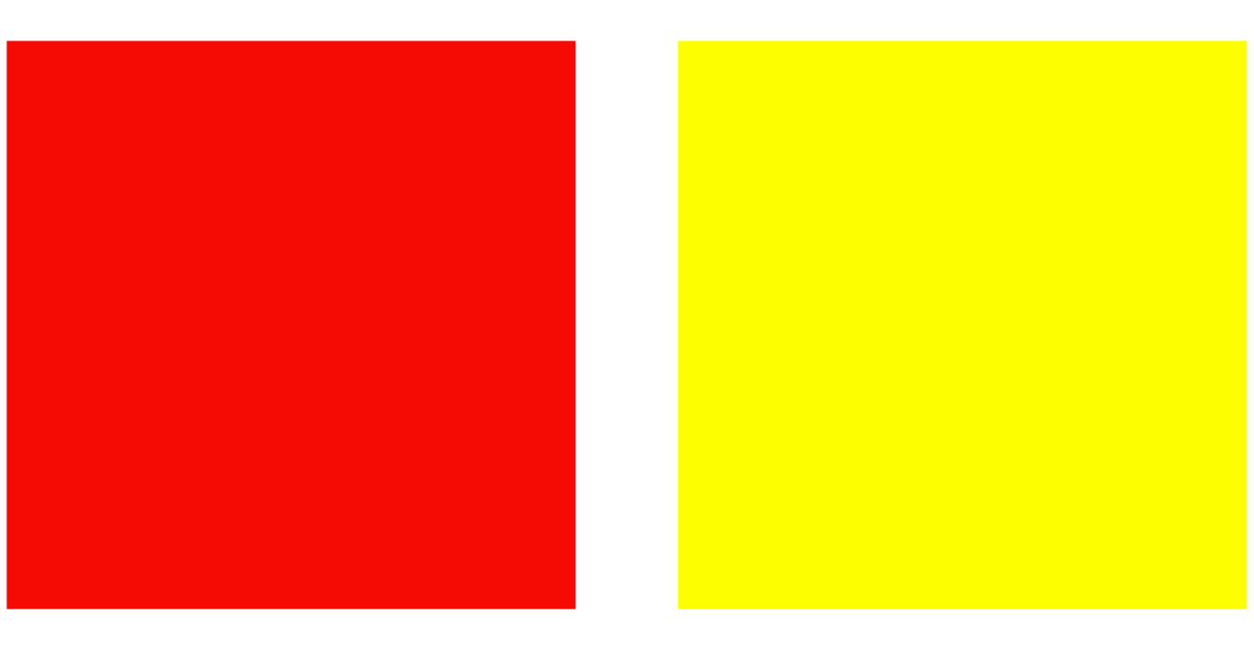
✓ **Congratulations! You passed!**

Next Item

✓ 1/1 points

1. Consider the code and two images below, in which the starting image named **image** is all red (each pixel has red value 255, green value 0 and blue value 0) as shown below on the left and the resulting image shown on the right below is supposed to be all green, but is all yellow. The image is a 200 pixel by 200 pixel image.

```
for (var pixel of image.values()) {
    if (pixel.getRed() > 250) {
        pixel.setGreen(255);
    }
}
```



Which one of the following would be the most helpful in identifying what is wrong with this code?

○ Print the x and y values of every pixel in the image before the for loop.

○ Print the x and y values of every pixel in the image before the for loop and again after the for loop.

○ Print the red, green and blue value of one of the pixels before the for statement.

● Print the red, green and blue values of one of the pixels before the for loop and again after the for loop.

Correct
Checking the RGB values for a pixel before and after the for loop could show how the for loop is affecting the pixel's color.

○ Print the width and height of the image.

○ Print the x and y values of every pixel with x < 10 and y < 10.

✓ 1/1 points

2. Which of the following options are steps in the scientific method approach to debugging? Choose the three best options below.

☐ Find Patterns

Un-selected is correct

☑ Gather Info & Apply Expert Knowledge

Correct
If you are having trouble with this question, review the "Finding Bugs in Code" video.

☑ Observe a Phenomenon

Correct
If you are having trouble with this question, review the "Finding Bugs in Code" video.

☑ Form Hypothesis

Correct
If you are having trouble with this question, review the "Finding Bugs in Code" video.

☐ Publish your Results

Un-selected is correct

☐ Ask for Help

Un-selected is correct

✓

3. Which of the following are important characteristics of a good hypothesis? Choose the two best options below.

☐ The hypothesis is complex

Un-selected is correct

☐ The hypothesis is simple

Un-selected is correct

☑ The hypothesis is actionable

Correct
If you are having trouble with this question, review the "Finding Bugs in Code" video.

☑ The hypothesis is testable

Correct
If you are having trouble with this question, review the "Finding Bugs in Code" video.

✓ 1/1 points

4. For which of the seven steps to solve a programming problem is the scientific method most useful?

● Debug failed test cases

Correct

○ Check by hand

○ Translate to code

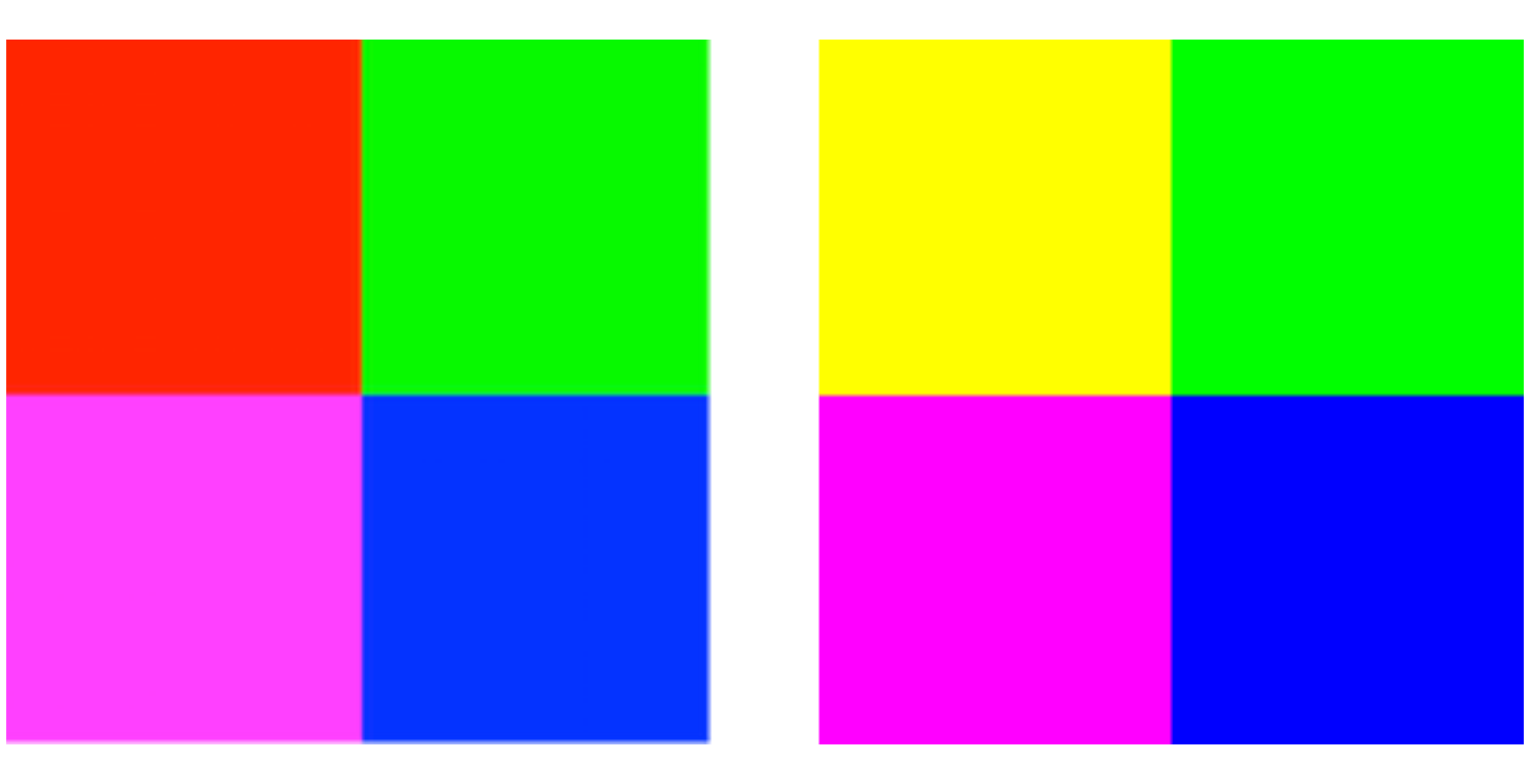
○ Work example by hand

✓ 1/1 points

5. Consider the following program:

```
1  var img = new SimpleImage(200,200);
2  for (var px of img.values()){
3      var x = px.getX();
4      var y = px.getY();
5      if (x < img.getWidth()/2){
6          px.setRed(255);
7      }
8      if (y>img.getHeight()/2){
9          px.setBlue(255);
10     }
11     else {
12         px.setGreen(255);
13     }
14 }
15 print (img);
```

It is supposed to produce the image on the left but it actually produces the image on the right.



Which of the following is the best hypothesis about how the program is broken?

○ Only pixels in the upper right quadrant should have their green values set to 255 but green values of the pixels in the upper left quadrant are also being set to 255.

○ The upper left quadrant is yellow instead of red.

● The upper left quadrant is yellow instead of red because line 12 inside the else statement applies to all pixels with a y value less than or equal to half the height of the image.

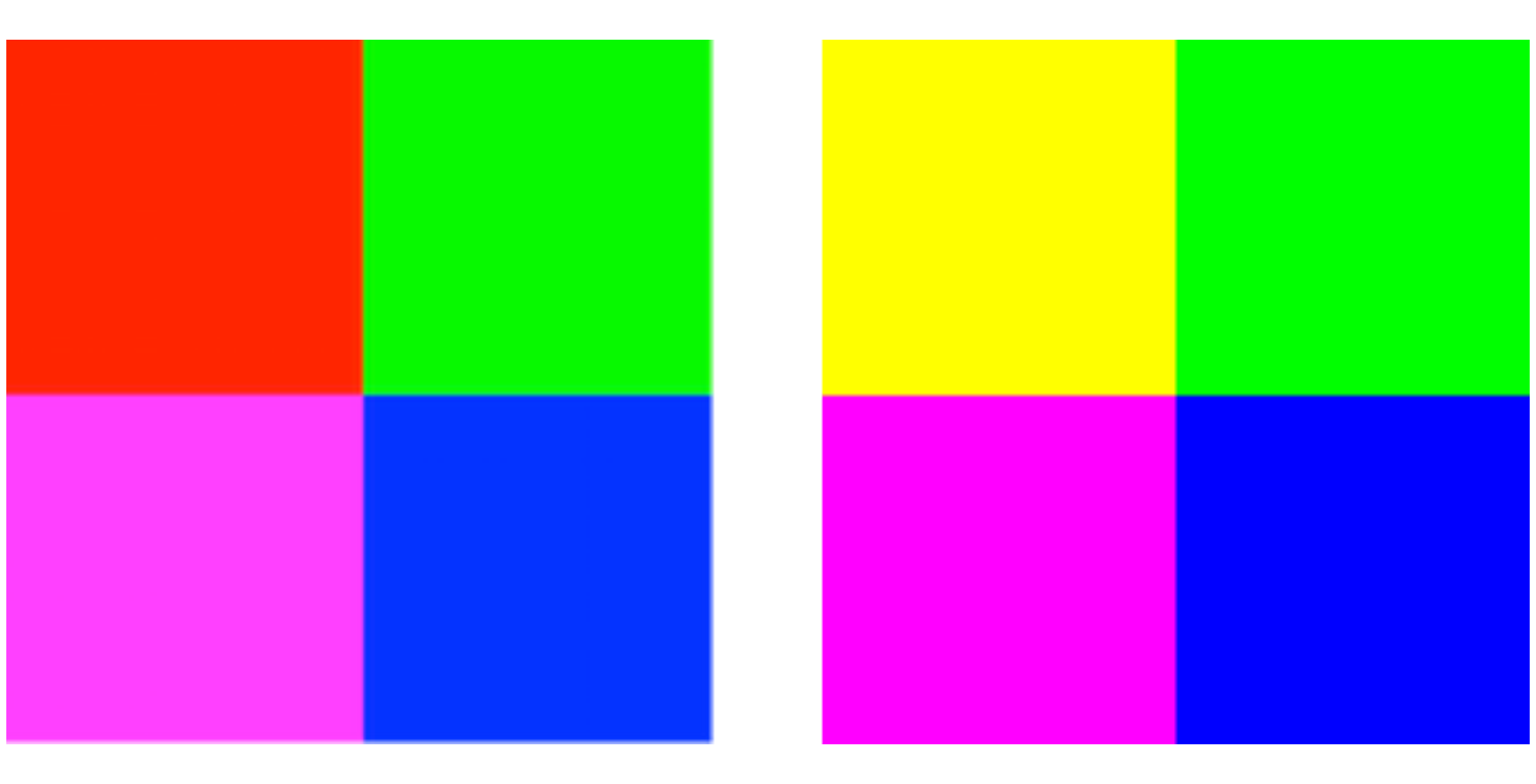
Correct
This hypothesis is <u>specific</u> and <u>actionable</u> because it describes where in the code the problem is.

✗ 0/1 points

6. Consider the program in the previous question, shown again here:

```
1  var img = new SimpleImage(200,200);
2  for (var px of img.values()){
3      var x = px.getX();
4      var y = px.getY();
5      if (x < img.getWidth()/2){
6          px.setRed(255);
7      }
8      if (y>img.getHeight()/2){
9          px.setBlue(255);
10     }
11     else {
12         px.setGreen(255);
13     }
14 }
15 print (img);
```

As a reminder, it is supposed to produce the image on the left but instead it produces the image on the right.



Which of the following changes to the code would fix the problem and produce the correct image?

○ Change the else to an if statement that checks whether a pixel is in the upper right quadrant.

○ Add another if statement after the else statement to change the red values of pixels in the upper left quadrant to 255.

● Move the else block to be after the first if statement instead of after the second.

This should not be selected
This makes the lower right quadrant cyan.

○ Remove the else statement.

✓ 1/1 points

7. Consider the function **addBorder** that has a parameter **image** and another parameter **thickness**. This function returns **image** with an added black border around each side of the image that is **thickness** pixels wide. It calls a function **setBlack** (which changes the color of a single pixel to black) to change the color of border pixels.

For example, calling addBorder with the image on the left and a thickness of 10 pixels results in the image on the right.

Which of the following <u>methods</u> must be used in the **addBorder** function? Select all that apply.

☐ setRed()

Un-selected is correct

☐ setBlack

Un-selected is correct

☑ getHeight()

Correct
You need to know the height of the image to determine whether pixels are within the borders and need to be changed to black.

☑ getX()

Correct
This method must be called to determine whether pixels are within the borders and need to be changed to black.

☑ getWidth()

Correct
You need to know the width of the image to determine whether pixels are within the borders and need to be changed to black.

☐ getGreen()

Un-selected is correct

☐ getBlue()

Un-selected is correct

☑ getY()

Correct
This method must be called to determine whether pixels are within the borders and need to be changed to black.

☐ setGreen()

Un-selected is correct

☐ setBlue()

Un-selected is correct

☐ getRed()

Un-selected is correct

☑ values()

Correct
This method must be called to iterate over all the pixels in the image and change the color of the border pixels.