



1 point

1. You may find it helpful to write a program to answer one or more of the following questions. You can access the *DukeLearnToProgram* JavaScript environment here: <http://www.dukelearntoprogram.com/course1/example/index.php> (also linked in the **Resources** tab).

Consider writing the function **crop(image, width, height)** that has three parameters: **image** is a complete image, and **width** and **height** are numbers. This function creates and returns a new image from the parameter image, with the new image having the width and height of the specified **width** and **height** parameters, thus cropping the picture by ignoring the pixels on the rightside or bottomside that are beyond the specified width or height of the picture.

Here is a possible **crop** function with some missing code.

```
1- function crop(image, width, height){
2   var n = new SimpleImage(width,height);
3-   for(var p of image.values()){
4     var x = p.getX();
5     var y = p.getY();
6     // MISSING CODE
7   }
8   return n;
9 }
```

Which one of the following is the correct missing code for the **crop** function?

☐

```
1- if (x < width || y < height){
2   var np = n.getPixel(x,y);
3   p.setRed(np.getRed());
4   p.setBlue(np.getBlue());
5   p.setGreen(np.getGreen());
6 }
```

☐

```
1- if (x < width || y < height){
2   var np = n.getPixel(x,y);
3   np.setRed(p.getRed());
4   np.setBlue(p.getBlue());
5   np.setGreen(p.getGreen());
6 }
```

☒

```
1- if (x < width && y < height){
2   var np = n.getPixel(x,y);
3   np.setRed(p.getRed());
4   np.setBlue(p.getBlue());
5   np.setGreen(p.getGreen());
6 }
```

☐

```
1- if (x < width && y < height){
2   var np = n.getPixel(x,y);
3   p.setRed(np.getRed());
4   p.setBlue(np.getBlue());
5   p.setGreen(np.getGreen());
6 }
```

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2. Consider the function **crop(image, width, height)** that has three parameters: **image** is a complete image, and **width** and **height** are numbers. This function creates and returns a new image from the parameter image, with the new image having the width and height of the specified width and height parameters, thus cropping the picture by ignoring the pixels on the rightside or bottomside that are beyond the specified width or height of the picture. Assume this function works correctly.

We select two images to start with:

```
1 var start = new SimpleImage("astrachan.jpg");
2 var hide = new SimpleImage("Message.jpg")
```

What is the remaining JavaScript code to take these two images and crop both of them using the **crop** function to make them the same smaller size?

☐

```
1 var startWidth = start.getWidth();
2 var startHeight = start.getHeight();
3 var hideWidth = hide.getWidth();
4 var hideHeight = hide.getHeight();
5
6 start = crop(start,hideWidth, hideHeight);
7 hide = crop(hide,startWidth, startHeight);
8 print(start);
9 print(hide);
```

☐

```
1 var startWidth = start.getWidth();
2 var startHeight = start.getHeight();
3 hide = crop(hide,startWidth, startHeight);
4 print(start);
5 print(hide);
```

☒

```
1 var cropWidth = start.getWidth();
2- if (hide.getWidth() < cropWidth) {
3   cropWidth = hide.getWidth();
4 }
5 var cropHeight = start.getHeight();
6- if (hide.getHeight() < cropHeight) {
7   cropHeight = hide.getHeight();
8 }
9 start = crop(start,cropWidth, cropHeight);
10 hide = crop(hide,cropWidth, cropHeight);
11 print(start);
12 print(hide);
```

☐

```
1 var cropWidth = start.getWidth();
2- if (cropWidth < hide.getWidth()) {
3   cropWidth = hide.getWidth();
4 }
5 var cropHeight = start.getHeight();
6- if (cropHeight < hide.getHeight()) {
7   cropHeight = hide.getHeight();
8 }
9 start = crop(start,cropWidth, cropHeight);
10 hide = crop(hide,cropWidth, cropHeight);
11 print(start);
12 print(hide);
```

1 point

3. Assume we will hide one image inside another image by hiding information inside half of each pixel. The **chop2Hide** function zeros out the lower half of each pixel's RGB components.

Suppose a particular pixel has a red value of 195 right before **chop2Hide** is called. What is that pixel's red value **after** **chop2Hide** is called on this image?

- ☒ 192
- ☐ 97
- ☐ 195
- ☐ 190
- ☐ 202

1 point

4. Assume we will hide one image inside another image by hiding information inside half of each pixel. The **shift** function moves the left half of each pixel's RGB components to the right, replacing the left half with all zeros. Suppose a particular pixel has a red value of 162 right before **shift** is called. What is that pixel's red value **after** **shift** is called on this image?

- ☐ 0
- ☒ 10
- ☐ 5
- ☐ 15
- ☐ 22

1 point

5. Assume we will hide one image inside another image by hiding information inside half of each pixel. If the red color of a pixel in image 1 is 212 (written as 8 binary bits that is 11010100) and the red part of the image 2 we want to hide is 168 (in 8 bits that is 10101000). Then what are the 8 bits for this red color after we have hidden image 2 in image 1 by hiding it in half the pixel data?

- ☐ 11011000
- ☒ 11011010
- ☐ 10101101
- ☐ 10100100
- ☐ 10001101
- ☐ 10000100

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6. The function **newpv** adds two integer parameters together and returns the result. As a safety check, it should also print a message if the result is too big for an RGB value, that is, bigger than 255. Which one of the following is the correct code for the function **newpv**?

☐

```
1- function newpv(p,q) {
2   var answer = p+q;
3   return answer;
4   if (p + q > 255) print("error: answer too big");}
```

☐

```
1- function newpv(p,q) {
2   if (answer > 255) print("error: answer too big");   var
   answer = p + q;
3   return answer;
4 }
```

☐

```
1- function newpv(p,q) {
2   var answer = p + q;
3   return answer;
4   if (answer > 255) print("error: answer too big");
5 }
```

☒

```
1- function newpv(p,q) {
2   var answer = p + q;
3   if (p + q > 255) print("error: answer too big");
   return answer;
4 }
```

1 point

7. The function **newpv** adds two integer parameters together and returns the result. Assume that this function works correctly, and in addition it prints an error message if a resulting pixel's red, green or blue value is bigger than 255.

The function **combine** has two image parameters a and b. It returns a new image that is the combination of the two images. That is a pixel in the new image will have a red value that is the sum of the red values of the pixels in the same (x,y) location from images a and b, a green value that is the sum of the two green values, and a blue value that is the sum of the two blue values. The function **combine** assumes the two images it is using to create the new image will not have any sums greater than 255. Consider the **combine** function below that has missing code in the body of the for loop.

```
1- function combine(a,b){
2   var n = new SimpleImage(a.getWidth(), a.getHeight());
3-   for(var pa of a.values()){
4     // missing code
5   }
6   return n;
7 }
```

Which one of the following has the correct missing code?

☐

```
1 var x = pa.getX();
2 var pb = b.getPixel(x,y);
3 var y = pb.getY();
4 var np = n.getPixel(x,y);
5 np.setRed(newpv(pa.getRed(),pb.getRed()));
6 np.setGreen(newpv(pa.getGreen(),pb.getGreen()));
7 np.setBlue(newpv(pa.getBlue(),pb.getBlue()));
```

☐

```
1 var x = pa.getX();
2 var y = pa.getY();
3 var pb = b.getPixel(x,y);
4 var np = n.getPixel(x,y);
5 pa.setRed(newpv(pa.getRed(),pb.getRed()));
6 pa.setGreen(newpv(pa.getGreen(),pb.getBlue()));
7 pa.setBlue(newpv(pa.getBlue(),pb.getBlue()));
```

☒

```
1 var x = pa.getX();
2 var y = pa.getY();
3 var pb = b.getPixel(x,y);
4 var np = n.getPixel(x,y);
5 np.setRed(newpv(pa.getRed(),pb.getRed()));
6 np.setGreen(newpv(pa.getGreen(),pb.getGreen()));
7 np.setBlue(newpv(pa.getBlue(),pb.getBlue()));
```

☐

```
1 var np = n.getPixel(pa.getX(), pa.getY());
2 np.setRed(newpv(pa.getRed(),pb.getRed()));
3 np.setGreen(newpv(pa.getGreen(),pb.getGreen()));
4 np.setBlue(newpv(pa.getBlue(),pb.getBlue()));
```

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