

CS 1316 – Homework 3 : More Image Manipulation

Due: Friday, Feb 5th, before 6pm

This is a pair programming problem! You are expected to work with the person you have been paired with in class, and you are both responsible for submitting the exact same code to T-Square.

For your next task at Adobe, your boss has asked you to create a subclass of the Picture class called BetterPicture.java and add some additional functionality to the new class. You are to create methods to generate proof sheets as well as a method to crop an image. The details of each method are explained below.

Proof Sheets:

You need two static methods with the same name (proofSheet) that produce proof sheets, [These two methods share the same name, but have different types of parameters, so the name is overloaded.] One version takes in an array of Pictures and one takes in a single Picture. The syntax should read:

```
Picture canvas = BetterPicture.proofSheet(Picture pic)
```

and:

```
Picture canvas = BetterPicture.proofSheet( Picture [ ] picArray )
```

- Each method should return a (newly created) 700x700 image.
- The proof sheet should contain up to four images scaled to fit in a 350x350 quadrant
 - i.e. the largest side of any resulting picture should be 350 pixels
 - Aspect ratio of pictures must be retained!
- The images must be centered in their quadrant
 - i.e. if an image is 300 pixels tall, it should have 25 pixels of space on the top and bottom
- The method with a single picture parameter should compose from left to right then top to bottom:
 - Original

- Black and White
- Negated
- Flipped
- The method with an array of pictures as the parameter should compose up to the first four images.
 - Even if the array only has 2 or 3 pictures, it should still compose them and leave some quadrants blank
 - The method should ignore any pictures after the fourth in the array
- If an array is passed in with only a single Picture element, it should call the other proofSheet method (that takes one picture) on that picture and return the resulting proof sheet.
- If an empty array (zero pictures) is passed in, it should return a blank proof sheet.



Single Image

Multiple Images

Crop:

You need to create an object method called crop which takes in four integer parameters to describe where to crop and returns a cropped version of the BetterPicture. This IS NOT a static method! The syntax should read:

```
BetterPicture bp = new BetterPicture("beach.jpg")
Picture cropped = bp.crop( 0,0,150,150)
```

- The parameters should read (xStart, yStart, xEnd, yEnd)
- Your code should test for bad input
 - i.e. xStart should be less than xEnd, all of the inputs should be within the picture.
 - If the input is bad, the method should return null
- The picture that your function returns should be “cropped” to only contain pixels between the starting and ending points.
- Note that to get this to work correctly, you will also have to build a constructor for BetterPicture that accepts a string and uses the Picture (superclass) constructor that creates a picture from a string.

Grading Rubric

- Overall
 - BetterPicture subclasses Picture correctly 5pts
- Proof Sheet
 - Headers and overloading correct 5pts
 - Images scaled correctly 15pts
 - Images composed to respective quadrants 10pts
 - Centered correctly 10pts
 - Picture array input cases handled correctly
 - 0 or 1 Picture 5pts
 - 2-4 Pictures 10pts
 - 5+ Pictures 5pts
 - Single picture proof manipulations correct 5pts
- Crop
 - Rejects bad input 10pts
 - Crops correctly 20pts