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
  o i.e. the largest side of any resulting picture should be 350 pixels
  
  o Aspect ratio of pictures must be retained!

• The images must be centered in their quadrant
  o 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:
  o 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.

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