

Name : _____

Grading TA: _____

- **INTEGRITY:** By taking this exam, you pledge that this is your work and you have neither given nor received inappropriate help during the taking of this exam in compliance with the Academic Honor Code of Georgia Tech. Do NOT sign nor take this exam if you do not agree with the honor code.
- **DEVICES:** If your cell phone, pager, PDA, beeper, iPod, or similar item goes off during the exam, you will lose 10 points on this exam. Turn all such devices off and put them away now. You cannot have them on your desk.
- **ACADEMIC MISCONDUCT:** Academic misconduct will not be tolerated. You are to uphold the honor and integrity bestowed upon you by the Georgia Institute of Technology.
 - Keep your eyes on your own paper.
 - Do your best to prevent anyone else from seeing your work.
 - Do NOT communicate with anyone other than a proctor for ANY reason in ANY language in ANY manner.
 - Do NOT share ANYTHING during the exam. (This includes no sharing of pencils, paper, erasers).
 - Follow directions given by the proctor(s).
 - Stop all writing when told to stop. Failure to stop writing on this exam when told to do so is academic misconduct.
 - Do not use notes, books, calculators, etc during the exam.
- **TIME:** Don't get bogged down by any one question. If you get stuck, move on to the next problem and come back once you have completed all of the other problems. This exam has 8 questions on 8 pages including the title page. Please check to make sure all pages are included. You will have 50 minutes to complete this exam.

I commit to uphold the ideals of honor and integrity by refusing to betray the trust bestowed upon me as a member of the Georgia Tech community. I have also read and understand the requirements outlined above.

Signature: _____

| Question | Points | Score |
|-------------------------|--------|-------|
| 1. Picture Mystery 2 | 4 | |
| 2. Vocabulary | 9 | |
| 3. Lambda short answers | 8 | |
| 4. Swap A/E | 10 | |
| 5. Short Answer | 7 | |
| 6. Invert Color | 12 | |
| 7. BigNumbersOnly | 12 | |
| 8. Save Light Values | 10 | |
| Total: | 72 | |

1. (4 points)

Examine the following code to determine what it does to the picture that is selected. Draw an original picture that is asymmetrical (Label it “original”). Now, draw the picture that would result if the code below were ran on your original picture. (Label it “Result”)

```
def Mystery():
    orig = makePicture( pickAFile() )
    result = copyPicture(orig)
    width = getWidth(orig)
    height = getHeight(orig)

    for x in range(0, width ):
        for y in range(0, height ):
            oPix = getPixel(orig, x,y)
            r,g,b = getRGB(oPix)
            rPix = getPixel(result, width-1-x, y)
            setRGB(rPix, (r,g,b))

    show(result)
```

2. (9 points)

For each of the following vocabulary terms, write a concise 1-2 sentence definition. Be brief, and to the point.

(a) [3 pts] int

(b) [3 pts] integer division

(c) [3 pts] local variable

3. (8 points)

For each of the following lines, write what it returns when evaluated:

(a) [2 pts] `range(3,20,4)`

(b) [2 pts] `filter(lambda X: X > 7, [2,8,15,21])`

(c) [2 pts] `map(lambda Y: Y + 3, [1, 2,8,15])`

(d) [2 pts] `reduce(lambda Z,W: Z+W, [2,4,16,20])`

4. (10 points)

Write a function named `swapAE` that takes in a string as a parameter. It should return a string where every 'a' and 'e' in the original string are swapped. You may assume that all letters in the string are lowercase.

Example run:

```
>>> result = swapAE('andy dreams of flying rockets' )
>>> result
'endy draems of flying rockats'
```

5. (7 points)

For each of the following questions, give a brief answer:

(a) [5 pts] For each of the following algorithms, list their Big O complexity class:

Linear Search:

Binary Search:

Bubble Sort:

Insetion Sort:

Merge Sort:

(b) [2 pts] Your intern has written an algorithm that will sort numbers. It can sort 1000 numbers in 1 second, and 5000 numbers in 25 seconds. What is the computational complexity (Big O) class of his algorithm?

6. (12 points)

Write a function named `invert` that accepts a string parameter named `fileName` that contains the file name of a picture on disk. Your function must load the picture and invert the color of every pixel. To invert the color of a pixel, take each of its color values and subtract them from 255. (i.e. $\text{newBlue} = 255 - \text{originalBlue}$). Your function should return the newly inverted picture.

7. (12 points)

Write a function named `bigNumbersOnly` that accepts the name of a file to open as a string parameter. The function should open the file, which will be formatted as follows (one number per line):

```
54
4.0
23.3
765.2
54
876.8
34
238
45
50
```

Your function must read in the file and return a *list* of all the numbers greater than 50 (numbers should be stored as floats). Remember to close your file after you are finished reading it. If you find duplicate numbers greater than 50, DO NOT include duplicates in the list!

8. (10 points)

Write a function named `saveLightValues` that accepts the name of a file to open as a string parameter. The function should open the file for writing, and save ten light values from calling the `getLight("center")` function, one per line. Between calls to the `getLight()` function to get light samples, the robot should turn left a small amount (you choose the speed and duration).

This page intentionally left blank. You may use it as scratch paper. If you place an answer on this page, box it, label it clearly, and indicate clearly on the original problem page that your answer is on the last page.