

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 6 questions on 6 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. Vocabulary	9	
2. Robot Drawing	8	
3. Functional Practice	7	
4. Algorithm Recognition	7	
5. grayLines	10	
6. Summer Interns	10	
Total:	51	

1. (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] operator

(b) [3 pts] pixel

(c) [3 pts] robot

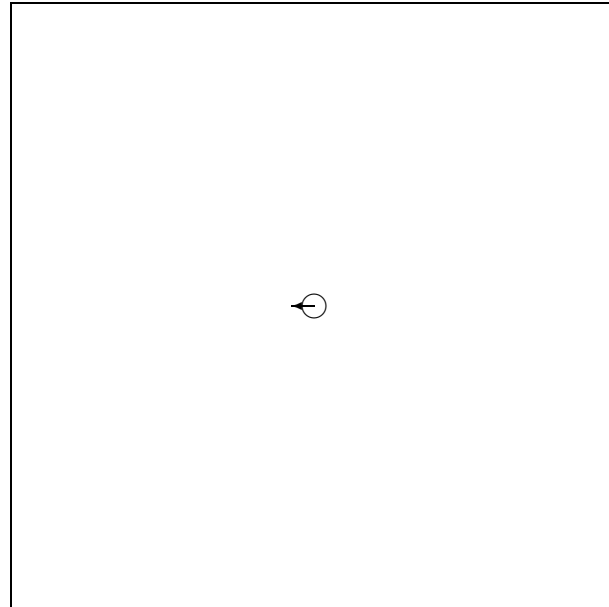
2. (8 points)

Draw the robot's trajectory when the following code is executed. Use a triangular arrow to indicate the robot's final "forward" direction. Assume that the robot starts in the middle facing towards the left of the paper ("west"). Assume that if you turn for one second the robot turns exactly 90 degrees. Assume that if you drive forward or backwards for one second the robot travels exactly 1 cm. Label each line segment drawn with the number of cm it is meant to represent. (Try to draw lines to scale.)

```

from Myro import *
init()
x=1
y = 1
aList = [(1,2),3,4,(5,6),(7,8)]
for i in range(len(aList)):
    if (i%x==0):
        turnRight(1,1)
    else:
        turnLeft(1,2)
        backward(1,1)
    if (i in [1,4]):
        y= y * -1
    if (y==1):
        forward(1,2)
        x = x + 1

```



3. (7 points)

Examine the following python code that uses functional programming.

```

a = [0, 1, 2, 3, 4, 5, 6, 7, 8, 9]
b = filter(lambda x: x % 2 == 0, a)
c = map(lambda x: x**3, b)
d = reduce(lambda x,y: x+y, c)

```

Tell us what each of the above variables refers to after the code is executed:

A: _____

B: _____

C: _____

D: _____

4. (7 points)

Pretend you are the python interpreter. Write down what is printed when the following code is executed beside the code. Draw a box around your final answer.

```
def mysterySortA(aList):
    for index in range(1,len(aList)):
        currentvalue = aList[index]
        position = index

        while position>0 and aList[position-1] > currentvalue:
            aList[position] = aList[position-1]
            position = position-1

        aList[position]=currentvalue
        print(aList)

aList = [93,54,26]
mysterySortA(aList)
```

What sorting algorithm is mysterySortA using?: _____

What Big O complexity class is this code?: _____

Pretend you are the python interpreter. Write down what is printed when the following code is executed beside the code. Draw a box around your final answer.

```
def mysterySearch(aList, aNum):
    position = 0
    for item in aList:
        if item == aNum:
            return position
        position = position + 1
    return -1

index = mysterySearch([9,3,2,6,1], 6)
print("index is:", index)
```

What is the name of this search? _____

What is the Big-O complexity class of this search? _____

5. (10 points)

Write a function named `grayLines` that accepts one parameter representing the name of a picture file on your disk as a string.

The function should load the picture, and convert every other column (i.e. columns 1,3,5,7, and so on) to grayscale. To do this, you should take the red, green, and blue values for each pixel, find their average, and place that average value back into all three color channels (r,g,b) of the pixel.

Then, it should save the picture with the name "grayLines.jpg". You may assume that the Myro picture functions are already imported.

Example call: `>>> grayLines("myPicture.jpg")`

6. (10 points)

Write a function named **summerInterns** 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 Employee, ID per line). You may assume that names all start with capital letters. Note that the lines may or may not have spaces after the comma:

```
Rachel,2300
Richard, 1020
Daniel,2301
Jorge, 231
David,2310
David,2315
```

Your function must read in the file and return a list of ONLY the names in Alphabetical order of the Summer Interns. You know that in order to be considered a Summer Intern your ID has to start with the number 23 (Example: 2310). Remember to close your file after you are finished reading it. If you find duplicate Employees (Same Name), DO NOT include duplicates in the list! For example, when using the above input, the function would work as follows:

```
>>> interns = summerInterns("Employees.txt")
>>> interns
['Daniel', 'David', 'Jorge', 'Rachel']
```