

Instructions:

- Please write clearly. What I cannot read, I will not grade.
- Show all your work in detail. I give partial credit.
- This exam has 8 pages including the title page. Please check to make sure all pages are included.
- This exam is closed book, closed notes, no calculators.
- Don't get bogged down on any one question. 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.

Signature: _____

Question	Points	Score
1. Vocabulary	15	
2. Recursion Fun	5	
3. Mystery Code	3	
4. Three Lambdas	6	
5. Lots-o-Letters	6	
6. Skip Every 3	8	
7. Factorial	6	
8. RedBlend	10	
9. BigO Graph	10	
Bonus Questions	0	
Total:	69	

Vocabulary Questions

1. For each of the following vocabulary terms, write a concise 1-2 sentence definition. Be brief, and to the point.
 - (a) (3 points) lambda
 - (b) (3 points) global variable
 - (c) (3 points) immutable data type
 - (d) (3 points) runtime error
 - (e) (3 points) semantic error

Code Understanding Questions

2. (5 points) Write down what would be **printed** when the following code is executed.

```
def rec(n):
    if(n<=1):
        return 1
    print n
    value= rec(n-1) + rec(n-2)
    return value

result = rec(5)
```

3. (3 points) What does this mystery function do? Tell us the result of calling

```
mysteryFunc(5)
```

```
def mysteryFunc(n):    # n is an integer
    if n == 0:
        return 0
    else:
        return n + mysteryFunc(n-1)
```

4. For each of the following lines, write what it returns:

(a) (2 points) `map(lambda X: X / 2, range(6))`

(b) (2 points) `filter(lambda X: X < 3, range(6))`

(c) (2 points) `reduce(lambda X,Y: X + Y + 1, range(6))`

5. (6 points) Question: What is the output of the following code when executed?

```
print "A"
B = "C"
#print D

def rabbit(E):
    B = "F"
    for G in range(E):
        print "H"
        print "I"

    print B

    if E > 3:
        return "J"
        print "K"

    return "L"

def turtle(M):
    global B
    if M > 5:
        print "N"
    elif M > 4:
        print "O"

    if M > 3:
        print "P"
    else:
        print "Q"

    B = "R"
    return "S"

print "T"
print rabbit(2)
print B
print turtle(6)
print B
```

Code Writing Questions

6. (8 points) The following code takes in a .txt file with a name on each line. The function needs to separate these names into groups of 3 by inserting a newline after every 3rd name, and write this new output to another file. Please fill in the blanks to make this function accomplish that goal.

Example Input and Output (Remember, your function must work for ANY input file NOT just this sample!)

Input File:

Sam
Peter
Micah
Melody
Austin
Mallory
Jason
Trevor

Then the output would be:

Sam
Peter
Micah

Melody
Austin
Mallory

Jason
Trevor

```
def separator(aFile):
    #Open the input file to read the names
    inFile = open(aFile, _____)
    #The output file to write to
    outFile = open("output.txt", _____)
    counter = 0
    #Read only the next line in the file
    name = inFile._____()

    while name != "":
        #Write the line to the output
        outFile.write(_____)
        counter += 1
        #Here is where we check if we need to insert a separation
        if counter == _____:
            #How do you separate the groups?
            outFile.write(_____)
            #What happens to the counter?
            counter = _____
        #read the next line
        name=inFile._____()

    inFile.close()
    outFile.close()
```

7. (6 points) Write a function named `factorial` that takes in an integer, and returns the factorial of that number. The factorial of a number ($n!$) is defined as being the product of all positive integers less than or equal to n . Mathematically that is $n! = \prod_{x=1}^n x$. Another way to write this is:

$$n! = \begin{cases} 1 & \text{if } n = 0; \\ n \times (n - 1)! & \text{if } n > 1; \end{cases}$$

So the factorial of 5 is $5 \times 4 \times 3 \times 2 \times 1 = 120$. Note that the factorial of zero is defined to be 1. You may assume that the number you will be given will be non-negative. You may solve this using a loop, recursion or any other method.

8. (10 points) Write a function named `redBlend` that accepts two pictures as parameters. It should set the red values in the first picture to the red value of the corresponding pixel in the second picture. You may assume that both pictures are the same size. Because you are modifying the first picture parameter, you do not need to return anything.

Some functions that might be helpful for this question:

- `getPixels(picture)`
- `getPixel(picture, x, y)`
- `getWidth(picture)`
- `getHeight(picture)`
- `getX(pixel)`
- `getY(pixel)`
- `getRed(pixel)`
- `setRed(pixel, value)`

9. (10 points) Draw a single graph with a line for each of the four main Big O complexity classes we have learned about. Label both the X and Y axes appropriately. For each line, label it with the Big O complexity class it represents, and also give the name of an algorithm that falls in that complexity class.
10. (3 points (bonus)) In this semester we have had 3 individual assignments (Face, Avoid Walls, My Program) and 6 pair assignments (Tips & Conversions, Base Conversions, Dance & Menu, Yellow Wall, Special FX, and Robot Movie)
- Which (if any) pair assignments do you wish were made into individual assignments?
 - Which (if any) individual assignments would you prefer be made into a pair assignment?
 - Do you think that the added overhead in partner assignments (of scheduling meeting times, and meeting with partners) was worthwhile? Did having a partner to work with allow you to finish the assignments faster, or learn more, or have more confidence in your understanding? Why or why not?