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. Multiple Choice	7	
2. Vocabulary	15	
3. Short Answer	6	
4. Fill in the Blank	7	
5. NumDoors	2	
6. Find the Error	3	
7. Robot Drawing	8	
8. countDownBy	8	
9. Factorial	6	
Bonus Questions	0	
Total:	62	

Multiple Choice

1. For each of the following questions, select the appropriate answer by circling it.

    (a) (1 point) x = raw_input("Please enter a number.") What is type(x)?

    A. None   B. bool   C. float   D. int   E. str   F. list

    (b) (1 point) Convert 11101001_2 to decimal (base 10):

    A. 217   B. 225   C. 232   D. 233   E. 234

    (c) (1 point) Convert 69_{10} to binary (base 2):

    A. 01000100   B. 01000101   C. 11000101   D. 01000111   E. 01001101   F. 01010101

    (d) (1 point) Which of these commands detects something behind the robot (non-fluke side)?

    A. getObstacle()   B. getIR()   C. getBright()   D. getLight()   E. getStall()

    (e) (1 point) Which of these statements evaluates to True?

        A. True or False and False
        B. True and False or False
        C. True and True and False
        D. not True or False

    (f) (1 point) Which of these is a legal expression?

        A. "A"+ "B"
        B. "A" - "B"
        C. "A" * "B"
        D. "A" / "B"

    (g) (1 point) Which of these is a legal expression?

        A. "A" + 5
        B. "A" - 5
        C. "A" * 5
        D. "A" / 5

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

    (a) (3 points) flow of execution

    (b) (3 points) keyword

(c) (3 points) parameter

(d) (3 points) traverse

(e) (3 points) modulus operator

Short Answer

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

   (a) (1 point) What is printed when the following lines of code are evaluated?
   ```
   s = "look, contents!"
   print s[ :7:2]
   ```

   (b) (3 points) What is printed when the following lines of code are evaluated?
   ```
   l = ["open", "close", "in", "out", "up", "down" ]
   for i in range(0,6,2):
       print l[i]
   ```

   (c) (2 points) Examine the following code:
   ```
   def foobar(x):
       if x == 0:
           return  1
       else:
           return foobar(x-1 ) + 1

   myVal = foobar(5)
   ```
   What value will be assigned to myVal?

4. (7 points) Complete each statement below by filling in the blank:

   1. A _____ loop iterates through all items in a sequence.

   2. A _____ is a named entity that can refer to data or functions.

   3. You can select a _____ out of a list by using a colon inside brackets, such as aList[3:5]

   4. You use _____ in your python programs, denoted by the # symbol, to explain in natural language how your program works.

   5. In python, the single equal sign is used for _____, while the double equal sign is used for _____.

Code Understanding

5. (2 points) What is printed by the following function if it is given the number 1 as n?

```
def numDoors(n):
   if n == 0:
      print "haha you can't get in!"
   if n == 1:
      print "good enough!"
   if n == 2:
      print "thats normal"
   else:
      print "That's funny!"
```

   >>> numDoors(1)

6. (3 points) Find the Error: The following code contains a statement that will cause a runtime error. Circle the line and explain what's wrong.

```
e = "2.718"
pi = 3.14
pie = str(pi) + e
print int(e)
print int(pi)
print pie
```
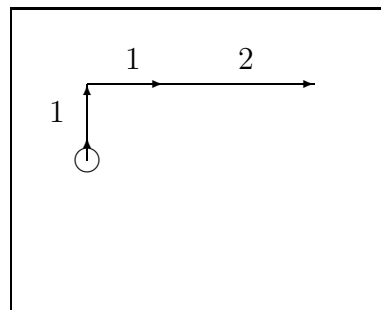
7. (8 points) Robot Drawing - Assume `turn90degrees()` has been defined as below so the robot turns right 90° and `nudge(x)` has been defined to move the robot forward x units.

```
def turn90degrees():
    turnRight(1, 1)

def nudge(x):
    forward(1, x)
```

The following code makes the robot drive the trajectory drawn in the box to the right.

```
nudge(1)
turn90degrees()
nudge(1)
nudge(2)
```
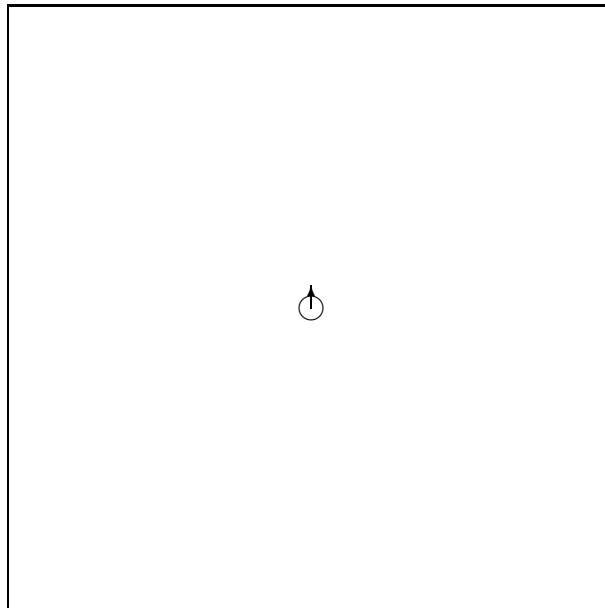

Draw the robot's trajectory when the following code is executed. Label the length of each move (nudge) using numbers as in the example above.

```
def turn90degrees():
    turnRight(1, 1)

def nudge(x):
    forward(1, x)

turns = [3,5]

for idx in [2,3,3,5,1]:
    if idx in turns:
        turn90degrees()
    nudge(idx + 1)
```

Code Writing Questions

8. (8 points) Write a function called `countDownBy` that accepts a single integer parameter and uses a while loop to **print** out a countdown from that number to zero (inclusive) counting by one each time. You may assume that your input will be positive.

Example:

```
>>> countDownBy(5)
5
4
3
2
1
0
```

9. (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.

10. (3 points (bonus)) (a) With respect to the front of the room, where do you usually sit in the lecture hall?
    - A. Closer to the front of the lecture hall
    - B. Closer to the middle of the lecture hall
    - C. Closer to the back of the lecture hall

    (b) With respect to the sides of the room, where do you usually sit in the lecture hall?
    - A. Closer to (my) left side of the lecture hall
    - B. Closer to the middle of the lecture hall
    - C. Closer to (my) right side of the lecture hall

    (c) Convert 1337 to binary:

This page intentionally left blank. You may use it for scratch work. If you continue an answer onto this page, indicate this clearly on the page the answer should have gone on, and label the answer by the problem number.