**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 9 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. Print vs. Return | 4 | |
| 3. Multiple Choice | 6 | |
| 4. Carol & Liz | 5 | |
| 5. Rappers & Lists | 5 | |
| 6. Slicing Loops | 10 | |
| 7. For2While | 5 | |
| 8. filterNums | 9 | |
| Total: | 53 | |

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] immutable data type

**Solution:** A (compound) data type in which the elements can not be modified. Assignments to elements or slices (sub-parts) of immutable values cause a runtime error.

(b) [3 pts] expression

**Solution:** A combination of variables, operators, and values that represents a single result value.

(c) [3 pts] slice

**Solution:** A subsequence copied from a sequence specified by a range of indices. The slice operator is: sequence[start:stop].

2. *(4 points)*
In two or three sentences, describe how the print function and return statement work in python. Be sure to list two differences between their behaviors.

**Solution:** Grading: +2 points for each difference. They can only get 4 total points even if they list all 3 differences.

The print function evaluates to or ”returns” a none-type value [+1] while the return statement returns whatever is the data type of the expression that follows it [+1].

The print statement causes output to the screen[+1] while the return statement causes a function to evaluate to a particular value[+1].

The return statement will terminate execution in a function when it is encountered [+1] while the print function will not. [+1].

3. *(6 points)*
For each of the following multiple choice questions, indicate the best answer by circling it.

(a) [1 pt] Given the following code, what is printed?

```
if type("True") == bool or type(5 // 4) == float:
   print ("Braves")
elif type(5) == int:
   print("Falcons")
else:
   print("Hawks")
```

A. `Braves`

**B.** `Falcons`

C. `Hawks`

D. A and B

E. None of the above

(b) [1 pt] What is the value of newStr after the code below is executed?

```
aStr = "abc"
anum="3"
newStr = aStr * len(anum)
```

A. `'abc3'`

B. `'abcabc'`

**C.** `'abc'`

D. `'abcabcabc'`

E. The code produces an error

(c) [1 pt] Assume the following code has been executed by the python interpreter:

```
y = 1**1*1/(1//2)
```

What is the value stored in y?

A. 1.0  B. 1  C. 2.0  D. 0.5  **E. The code raises an exception**

(d) [2 pts] Assume the following code has been executed by the python interpreter:

```
z = 4//2/2
```

What is the TYPE of the value stored in z?

A. Integer  **B. Float**  C. String  D. List  E. NoneType

What is the VALUE stored in z?

A. 1  **B. 1.0**  C. '1'  D. '1.0'  E. 4  F. 4.0  G. '4'  H. '4.0'

(e) [1 pt] What is the type of the data stored in X after this line of code is executed?

```
X = print("2.0")
```

A. String  B. Int  C. Float  D. Bool  **E. NoneType**

4. *(5 points)*
Trace through the following piece of code as if you were the python interpreter.

```
def carolSays(x):
    if x % 2 == 0:
        print(’Hi!’)
    if x % 3 == 0:
        print(’My name is Carol!’)

def lizSays():
    x = 8
    if x > 5:
        print(’Nice to meet you!’)
    elif x > 6:
        print("I don’t like you.")

    aNum = 1
    while aNum < 5:
        carolSays(aNum)
        aNum = aNum + 1


lizSays()
```

Write exactly what would be printed to the screen when the code is excuted:

**Solution:**

```
Nice to meet you!
Hi!
My name is Carol!
Hi!

Grading:
+1 pt for each correct line in the correct order (up to 4)
+1 extra point if they got it exactly right. (5 total for a perfect answer)
-1 point for each "extra" or "additional" line that shouldn’t be there.
 (overall problem can not go negative.)
```

5. *(5 points)*
Trace through the following piece of code as if you were the python interpreter.

```
someList = [1, 'Kanye', 'Fiddy', 0]
aList = [7, 0, 'Gucci', 'Weezy', 14]

def sortRappers(aList):
   someList = []
   for numRapper in aList:
      try:
        bank = numRapper / 2
        tempStr = 'I make {} billion trillion, son.'.format(bank*2)
      except:
        tempStr = 'Hello there, my name is {}. '.format(numRapper)

        someList.append(tempStr)
   return someList

partialResult = sortRappers(someList)
result = partialResult[2]
```

What does the result variable point at once the code has executed?

**Solution:** The result variable is not defined. as the partialResult list does not have 3 items in it. The last line of code will throw an exception (index out of range).
Grading:
+2 for saying it's a "Hello there" string.
+4 for saying it doesn't exist.
+5 for explaining why it doesn't exist.

6. *(10 points)*
Read the following pieces of code. Write down exactly what would be printed as each for loop is executed:

```
aString = "01234"
bString = "43210"
cString = "ABCDE"
```

(a) [2 pts]

```
for c in aString[::-1]:
    print( cString[ int(bString[ int(c) ]) ], end="")
```

**Solution:** ABCDE

(b) [2 pts]

```
for c in aString[::1]:
    print( cString[ int(bString[ int(c) ]) ], end="")
```

**Solution:** EDCBA

(c) [2 pts]

```
for c in aString[1:4:2]:
    print( cString[ int(bString[ int(c) ]) ], end="")
```

**Solution:** DB

(d) [2 pts]

```
for c in aString[1:2:4]:
    print( cString[ int(bString[ int(c) ]) ], end="")
```

**Solution:** D

(e) [2 pts]

```
for c in aString[4:2:-1]:
    print( cString[ int(bString[ int(c) ]) ], end="")
```

**Solution:** AB

7. *(5 points)*
Examine the following code:

```
aStr = "This is only a test!"
for char in aStr:
   print(char*2)
```

Now, pretend that the ”f” key on your keyboard has failed, so that you can not use the ”for” keyword. Re-write the code above using a while loop instead of a for loop. You must use a while loop, and may not use the ”for” keyword.

**Solution:**

```
aStr = "This is only a test!"
index = 0
while index < len(aStr):
  char = aStr[index]
  print(char*2)
  index = index + 1
```

Grading:
+1 for using an index variable
+1 for starting index variable at zero
+1 for ending when index is no longer less than the len of aStr
+1 for incrementing the index variable
+1 for correctly indexing into aStr to get char.

8. *(9 points)*
Write a function named `filterNums` that takes in a list of items as a parameter. Your function should return a new list that has only the numbers (int/float) from the original list. Do not modify the original list.

**Example test case**:

```
>>> a = [10, 20.0, True, "Hello", None, 3]
>>> x=filterNums(a)
>>> print(a)
[10, 20.0, True, "Hello", None, 3]
>>> print(x)
[10, 20.0, 3]
>>>
```

**Solution:**

```
def filterNums( aList ):
  newList = []
  for item in aList:
     if type(item) == int or type(item) == float:
        newList.append(item)
  return newList
```

Grading: 1 point for a correct header.
2 points for iterating through the original list.
2 points for testing if the item is a float or int.
2 points for copying any numbers into the new list.
1 point for returning a new list.
1 point for NOT modifying the original list.