

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 will result in a substantial grade penalty.
 - 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 7 questions on 10 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. Fill a Dictionary	3	
3. Functional: Count Threes	4	
4. Multiple Choice	7	
5. Regular Expressions	9	
6. Get Users	12	
7. Draw Tree	8	
Total:	52	

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] lambda

Solution: A piece of code which can be executed as if it were a function but without a name. (Lambda is also a keyword used to create such an anonymous function.)

(b) [3 pts] keyword

Solution: A reserved word that is used by the compiler to parse program; you cannot use keywords (such as if, def, and while) as variable or function names (identifiers).

(c) [3 pts] delimiter

Solution: A character that is used to separate (or delimit) separate data items in a string. The default delimiter for comma separated value (CSV) files is the comma.

Looking for: Separation of data items.

2. (3 points)

Examine the code below. Write the contents of the dictionary after the code runs. You may either list a table of key/value pairs, or write what would be printed to the screen if you executed `print(myD)` at the python prompt.

```
myD = {}
```

```
for i in range(5):
    myD[i] = i*20
```

Solution:

Key Value

```
0 0
1 20
2 40
3 60
4 80
```

Grading:

3pts = table completely correct. (They can also write out a dictionary using python syntax if they get it correct...)

2 pts - Forget one table entry.

1 pt - Get just the keys or just the values.

3. (4 points)

Entirely re-write the following function using functional programming instead of iteration. You may **not** use iteration (for/while loops) or recursion. The function counts the number of three's in a list and returns the count.

```
def countThrees( aList ):
    counter = 0
    for item in aList:
        if item == 3:
            counter = counter + 1
    return counter
```

Solution:

```
def countThrees(aList):
    onlyThrees = list( filter( lambda x: x==3, aList) )
    return( len( onlyThrees ) )
```

Grading:

+2 for the correct lambda or helper function

+1 for the correct call to filter

+1 for returning the correct value (len of new list)

4. (7 points)

For each of the following multiple choice questions, indicate the single most correct answer! Indicate your selected answer by circling it.

(a) [1 pt] Which of the following ways will correctly place attributes in an XML Element? You may assume etree is the correct import.

- A. `myDict = {"key1": "value1"}`
`element = etree.Element("tag", myDict)`
- B. `element = etree.Element("tag", key1="value1", key2="value2")`
- C. `element = etree.Element("tag")`
`element.get("key1", "value1")`
- D. `element = etree.Element("tag")`
`element.set(value1 = "key1")`

(b) [1 pt] Which of the following statements is correct of proper XML?

- A. **A particular XML tree may possess only one root.**
- B. An element may have only one child.
- C. Every element must have an opening and closing tag.
- D. An element may not have an attribute named 'text'.

(c) [1 pt] Every element in an XML tree has at least one parent.

- A. True **B. False**

(d) [1 pt] Given the following line of XML, what is the correct term for "mystery1"?

```
<mystery1 mystery2="mystery3">mystery4</mystery1>
```

- A. **Tag**
- B. Attribute
- C. Text
- D. Element

(e) [1 pt] Which of the following is the return type of a PyMySQL cursor object's execute method?

- A. None **B. int** C. float D. `<pymysql.cursors.Cursor object>`

(f) [1 pt] Which of the following python expressions is invalid? Assume that all named variables exist, refer to data of the type implied by their name, and all indexed subelements exist.

- A. `aList[2] = aList[4]+aList[5]`

- B. `dictionary1.append(23)`
- C. `tupleA = tupleA+(3,)`
- D. `aNum = 24+ord('a')`
- E. All statements above are valid.

(g) [1 pt] Given the following code:

```
request = urllib.request.urlopen("http://www.google.com"):
```

- A. `print(request)` will output the HTML
- B. `print(html(request))` will output the HTML
- C. `print(request.read())` will output the HTML
- D. `print(str(request))` will output the HTML

5. (9 points)

(a) [3 pts] Write a regular expression that will match undergraduate class labels. A class label has between 2 and 4 capital letters, followed by a space, followed by a 4 digit number. The four digit number must begin with a 1,2,3 or 4 only!

Solution: One example: `[A-Z]{2,4} [1-4]\d\d\d`

Grading: +1 for matching 2-4 Capital letters.

+1 for matching 4 digit numbers.

+1 for limiting the first digit to 1-4.

(-1 if they forget the space!)

(b) [3 pts] Write a regular expression that will match any product code from the ACME Widget Corp. An ACME Widget Corp product code follows one of the following two formats: AAAA-DDDD or DD-DDDD (where A represents an upper or lowercase letter, and D represents a digit.)

Solution: One example: `(?:[A-Za-z]{4}-\d{4})|(?:\d{2}-\d{4})`

Grading: +1 for matching AAAA-DDDD

+1 for matching DD-DDDD

+1 for doing a successful OR between (AAAA-DDDD) and (DD-DDDD)

(c) [3 pts] Write a regular expression that will match dollar amounts inside of square brackets, such as: `[$42]` or `[$234321]` Match the entire pattern, including brackets. The dollar amount will have one or more digits, but will not have periods or commas.

Solution: One example: `\[\$\d+\]`

Grading: +1 for escaping brackets to match.

+1 for escaping dollar sign to match.

+1 for matching one or more digits.

6. (12 points)

A BrokerageTransaction table has been created with the following command:

```
CREATE TABLE BrokerageTransaction (  
TransactionID INTEGER NOT NULL AUTO_INCREMENT,  
User TEXT, Type TEXT, Stock TEXT, Quantity INTEGER);
```

Each record in this table represents a stock transaction by a particular User. You have been asked to generate a report in CSV format that has each User listed once, with the total number of GT stocks they have ever purchased (Stock = "GT" and Type="Buy"). Please order the CSV file output alphabetically by username. Note that users may have made multiple transactions. For example, if the User "Bob" had bought 3 GT stocks in one transaction, sold 1 GT stock, purchased one UGA stock, and then purchased 2 GT stocks in another transaction, his line in the CSV output file would look like:

Bob, 5

(Showing the total number of GT stock purchased, not the current holding of GT stock.)

Write a function named **exportGTTotals** that opens a connection to the academic-mysql.cc.gatech.edu database using the "cs2316db" database and the "cs2316" username with "SECRET" as the password. It should download the data and write the output to a CSV file named "GTExport.csv".

Solution:

```
import pymysql  
import csv  
  
def exportGTTotals():  
    db = pymysql.connect(host='academic-mysql.cc.gatech.edu', user='cs2316',  
                        db='cs2316db', passwd="SECRET")  
    c = db.cursor()  
    SQL = """SELECT User, SUM(quantity), FROM BrokerageTransaction  
    WHERE Stock = 'GT' and Type = 'Buy'  
    GROUP BY User ORDER BY User"""  
  
    c.execute(SQL)  
  
    f = open("GTExport.csv", "w", newline='')  
    writer = csv.writer(f)  
    for item in c:  
        writer.writerow(item)
```

```
f.close()
c.close()
db.close()
```

Grading:

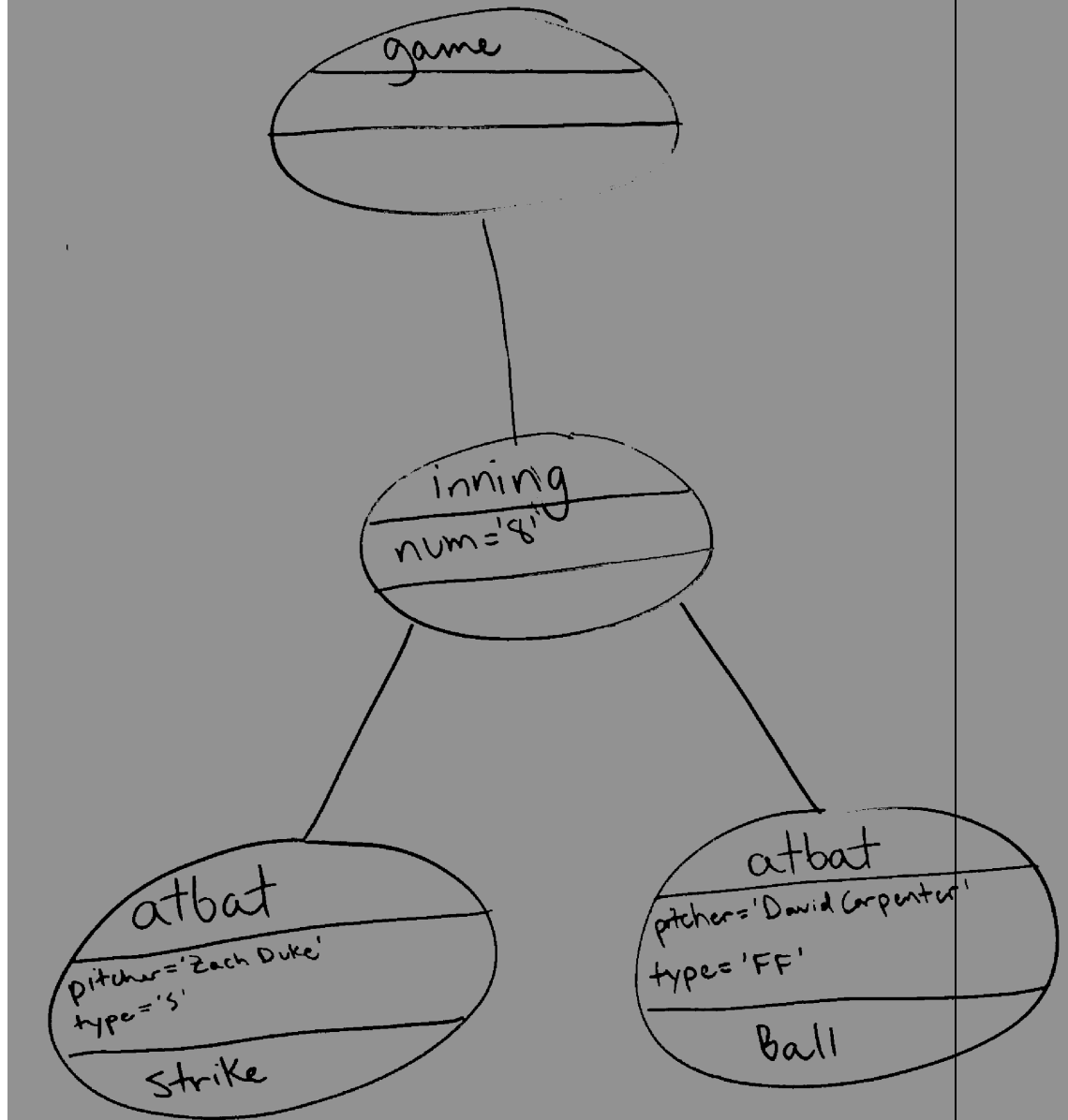
- +1 point for importing pymysql (-1 if they used csv without importing it)
- +1 point for correct db connection with all parameters.
- +1 for having a valid SQL statement that retrieves the data.
- +1 for executing the SQL statement.
- +2 points for summing up total of GT Purchases for each user, either in SQL or via some complicated python.
- +1 for opening the correct output file in write mode.
- +2 for writing each row of data out correctly.
- +3 for closing the file, cursor, and database objects!

7. (8 points)

Draw the object tree hierarchy that is encoded by the following textual XML:

```
<?xml version="1.0" encoding="UTF-8">
<game>
  <inning num="8">
    <atbat pitcher="Zach Duke" type="S">Strike</atbat>
    <atbat pitcher="David Carpenter" type="FF">Ball</atbat>
  </inning>
</game>
```

Draw each element individually as a circle that contains the tag name, attribute key/value pairs on separate lines, and any text, in that order. Draw a line between each parent and (direct) child element, with an arrow head pointing towards the child element.



Solution:

Grading:

+1 for correct root element, (game) with no parent

+1 for inning element as child of game

+1 for inning attribute num=8

+2 for having two atbat nodes under the inning node.

+3 for having correct pitcher & type attributes, and Strike/Ball text.

(-1 for each incorrect one, max penalty -3)

-1 if any node is missing an arrow, maximum penalty of 2