NAME (print): ____________________________________________

Netid: ________________

Community Standard Acknowledgement (signature): ________________________________

Do NOT spend too much time on any one question.

In writing code you do not need to worry about specifying the proper import statements. Assume that all libraries we’ve discussed are imported in any code you write.

Do not discuss this test with anyone until the test is returned. Do not use the web, PyCharm, or any programming environment that checks your code.

<table>
<thead>
<tr>
<th>Problem</th>
<th>value</th>
<th>grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem 1</td>
<td>2 pts.</td>
<td></td>
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<tr>
<td>Problem 2</td>
<td>28 pts.</td>
<td></td>
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<tr>
<td>Problem 3</td>
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<td>Problem 4</td>
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<tr>
<td>Problem 5</td>
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<tr>
<td>Problem 6</td>
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</tbody>
</table>

TOTAL: 84 pts.
PROBLEM 1:  (Honor Code (2 pts))

Print your name to acknowledge the Duke Community Standard
Print your name again to say you have read all the rules for the exam and agree to follow
them (including not using the web, classmates, Pycharm, or other environments to determine
answers to your program).

PROBLEM 2:  (List Comprehensions (28 pts))

For each of the following problems, assign the variable result to a Python expression that
calculates the answer. That means if we changed the list given, your code would still calculate
the correct answer.
Each of these must be written in one line and include a list comprehension.

Here is an example.
The variable result should calculate the list of words from vehicles that have the letter ‘a’
in their word. Assume each string in the list is one word that is lowercase.
Using the list vehicles below, result would calculate the list:

`vehicles = ['train', 'airplane', 'car', 'longboard']`

result = [w for w in vehicles if 'a' in w]

PART A (4 pts)
The variable result should calculate the list of colors from the list hues that don’t end in a
vowel.
Using the list named hues and string named vowels below, the variable result would calculate

`hues=['orange', 'cyan', 'purple', 'teal', 'blue', 'green']`

result = ____________________

PART B (4 pts)
The variable result should calculate the list of integers from the list nums whose square is
less than 40.
Using the list nums below, the variable result would calculate [4, 1, 6, 3, 5, 0].

nums = [4, 1, 10, 6, 8, 7, 3, 5, 0]
result = ________________

PART C (4 pts)
The variable result should calculate the sum of the integers from the list nums that are at
least 4 and less than 30.
Using the list nums below, the variable result would calculate 70.

nums = [7, 31, 12, 85, 18, 30, 4, 29]
result = ________________

PART D (4 pts)
The variable result should calculate the list that contains the second letter of each word from
the list words.
Using the list named words and string named vowels below, the variable result would calculate
[‘e’, ‘o’, ‘o’, ’x’, ’r’, ’o’].

result = ________________

PART E (4 pts)
The variable result should calculate the list of strings from the list words where the first
letter is either ’a’, ’e’, or ’i’ of the string vowels.
Using the list words below, the variable result would calculate [’and’, ’is’].

lst = [’test’, ’prep’, ’and’, ’one’, ’for’, ’other’, ’classes’, ’is’, ’hard’]
vowels = ’aeiou’
result = ________________

PART F (4 pts)
The variable result should calculate the list of all even integers from the list nums, multiplied
by 10.
Using the list nums below, the variable result would calculate [20, 80, 200, 440].

nums = [1, 2, 5, 8, 11, 20, 43, 44]
result = ________________

PART G (4 pts)
The variable result should calculate the list of the remainder of all integers from the list
nums divided by four.
Using the list nums below, the variable result would calculate [1, 2, 1, 0, 3, 0, 3, 2].

nums = [1, 2, 5, 8, 11, 20, 43, 42]
PROBLEM 3:  (Short Code (16 points))

For each of the following problems, use only what is indicated to write ONE line of code to either assign a value to result or change the specific value. You may use Python methods. However, you cannot simply create a new data type, for example, that includes elements that correctly solve the problem. You must use what’s give in the original data type(s) to solve the problem and not a literal value.

Here is an example.
Use phrase with indexing and the concatenation of two items to set result to the string 'by'.

```python
phrase = 'bicycle'
result = phrase[0] + phrase[3]
```

Note this answer uses only phrase and indexing, and the concatenation of two items. It does not simply assign the string result = 'by'.

PART A (4 pts)
Use set operations to determine what is in names3 that is not common across names2 and names1. That is, {'Kia', 'Blake', 'Jermaine'}.

```python
names1 = {'Aaron', 'Blake', 'Denice', 'Jacqueline', 'Timothy'}
names2 = {'Kim', 'Aaron', 'Erin', 'Tia', 'Jermaine'}
names3 = {'Jermaine', 'Kia', 'Blake', 'Aaron'}
result = ----------------------------------
```

PART B (4 pts)
Using indexing and tuple operations, update the tuple to (15, [5, 10, 45], 30). This requirement should include how the value 45 is determined.

```python
value = (15, [5, 10], 30)
result = ____________________________
```

PART C (4 pts)
Using indexing and concatenation, create the string 'yelp'.

```python
value = ('yellow', 'aqua', 'pink')
result = ____________________________
```

PART D (4 pts)
Using indexing, create the list ['purple', 'color'].

```python
value = (15, 'color', ['purple', 10])
result = ____________________________
```
The local art museum stores information on artists in a list, where each item in the list is a sublist containing one artist, one painting, and the year it was created (in this order). Here is an example: 

\[
\]

The museum is interested in identifying some important information regarding their current collection. Answer each subproblem below based on this information.

**PART A: Earliest Piece (10 pts)**

Create the function `firstPiece` that has one parameter: `artists`, which is a list of lists that represents the full inventory. The function returns the earliest painting in their collection. Assume that if two paintings were created in the same year, then the first painting in the list with that year is the one that will be returned.

<table>
<thead>
<tr>
<th>call</th>
<th>returns</th>
<th>comments</th>
</tr>
</thead>
</table>

Complete the function `firstPiece` below.

```python
def firstPiece(artists):
```

```python
def firstPiece(artists):
```
PART B: Total Pieces, by Artist (10 pts)

Create the function `artistCount` that has two parameters: `artists`, which is a list of lists that corresponds to the full inventory, and `name`, which is the name of an artist. The function returns the number of paintings by `name` in their collection. Assume that the artist has at least one painting in the collection.

<table>
<thead>
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</tr>
</thead>
</table>

Complete the function `artistCount` below.

```python
def artistCount(artists, name):
```

```python
def artistCount(artists, name):
    # Your implementation here
```
Create the function `calculateAvg` that has one parameter: `states`, which is a list of tuples that contain a string representing the two-letter state acronym and the yearly average temperature. The function returns the average temperature of all states included in the list. Ignore any formatting to determine a specific number of decimal points (do not worry about this).

<table>
<thead>
<tr>
<th>call</th>
<th>returns</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>calculateAvg([('NC', 58), ('GA', 62), ('SC', 61), ('NY', 48)])</code></td>
<td>57.25</td>
</tr>
<tr>
<td><code>calculateAvg([('MD', 54), ('NC', 58), ('VT', 43)])</code></td>
<td>51.66</td>
</tr>
<tr>
<td><code>calculateAvg([('NC', 58)])</code></td>
<td>58.0</td>
</tr>
</tbody>
</table>

Complete the function `calculateAvg` below.

```python
def calculateAvg(states):
```
PROBLEM 6 :  (Reading and Debugging Programs (8 pts))

Consider the following program, which is designed to create a file that stores the pay for each student UTA and the total amount paid to all UTAs for week 12 in a file named week12.txt:

```python
f = open("../..\lectures/data/week12.txt", "w")
names=["Kim", "Aaron", "Rhonda", "Leslie", "Tonisha", "James"]
pay=[326.50, 180, 200.25, 150, 250, 145.50]
f.write("Student Pay for Week 12\n")
for x in range(len(names)):
    f.write(names[x]+": "$+str(pay[x])+"\n")
    total+=pay[x]
f.write("Total paid to students for week 12: "$+str(total))
f.close()
```

This program does not compile. It produces one error.

a) (2 points) Where is the error located?

b) (2 points) What is the error?

b) (4 points) Briefly explain how you would fix this code so that it worked as intended.