Assignment 3 – PYTHON LISTS

Due: 4:30pm, May 16
Worth: 3% of your final mark
Topic: Python lists
This assignment is marked out of 30

For Assignment 3, a program containing the skeleton and testing code for the 7 Assignment 3 questions has been posted on the CompSci 101 Assignments website. Download this program from the CompSci 101 assignments website:

https://www.cs.auckland.ac.nz/courses/compsci101s1c/assignments/

Develop the solution to each function in the program. Once you are happy that your function executes correctly, submit the whole function to CodeRunner2:

https://coderunner2.auckland.ac.nz/moodle/

When you press the SUBMIT button in CodeRunner2, you will receive immediate feedback telling you if you have passed all the tests for the question. You can submit as many times as you like. You need to submit one function at a time.
Define the get_funny_average() function which is passed a list of numbers as a parameter and returns the average of some of the numbers in the parameter list. The function returns the average of the remaining numbers (rounded to 1 decimal place) after all the following have been excluded from the parameter list of numbers (if they exist in the list):

- all zeroes,
- all negative numbers,
- and
- the two smallest positive numbers.

For example, the following code:

```python
print("1. [ 3, 2, 0, 25, 1]: "
      get_funny_average([ 3, 2, 0, 25, 1]))
print("2. [-6, -32, 2, 0, -51, 1, 0, 0]: "
      get_funny_average([-6, -32, 2, 0, -51, 1, 0, 0]))
print("3. [56, 32, 2, 22, 22]: "
      get_funny_average([56, 32, 2, 22, 22]))
print("4. [-56, -3, 0, -21, 0, 6, 5]: "
      get_funny_average([-56, -3, 0, -21, 0, 6, 5]))
print("5. [56, 3, 2, 0, 251, 1, 41, 22]: "
      get_funny_average([56, 3, 2, 0, 251, 1, 41, 22]))
print("6. [-56, -3, 2, 0, -251, 1, -41, 0]: "
      get_funny_average([-56, -3, 2, 0, -251, 1, -41, 0]))
print("7. []: "
      get_funny_average([]))
```

prints:

1. [ 3, 2, 0, 25, 1]: 14.0
2. [-6, -32, 2, 0, -51, 1, 0, 0]: 0.0
3. [56, 32, 2, 22, 22]: 36.7
4. [-56, -3, 0, -21, 0, 6, 5]: 0.0
5. [56, 3, 2, 0, 251, 1, 41, 22]: 74.6
6. [-56, -3, 2, 0, -251, 1, -41, 0]: 0.0
7. []: 0.0

```python
def get_funny_average(numbers):
    return 0
```
A memory game is played (and scored) as follows:
Random numbers between 0 and 10 (zero inclusive) are called out one at a time. In this memory game the player can remember a maximum of 5 previously called out numbers. If the called number is already in the player's memory, a point is added to the player's score. If the called number is not in the player's memory, the player adds the called number to his memory, first removing another number if his memory is full. In our simulation of this game, the number which is removed from the player's memory is the number that has been in the player's memory the longest time. For example, if the random numbers are [3, 4, 3, 0, 7, 4, 5, 2, 1, 3], the game proceeds as follows:

Called number 3:  Score: 0, Numbers in memory: [3]
Called number 4:  Score: 0, Numbers in memory: [3, 4]
Called number 0:  Score: 1, Numbers in memory: [3, 4, 0]
Called number 7:  Score: 1, Numbers in memory: [3, 4, 0, 7]
Called number 4:  Score: 2, Numbers in memory: [3, 4, 0, 7]
Called number 5:  Score: 2, Numbers in memory: [3, 4, 0, 7, 5]
Called number 2:  Score: 2, Numbers in memory: [4, 0, 7, 5, 2]
Called number 1:  Score: 2, Numbers in memory: [0, 7, 5, 2, 1]
Called number 3:  Score: 2, Numbers in memory: [7, 5, 2, 1, 3]

Complete the get_memory_score() function which is passed a list of random numbers as a parameter and returns the final score using the algorithm described above. For example, the following code:

print("1. Score:", get_memory_score([3, 4, 1, 6, 3, 3, 9, 0, 0, 0]))
print("2. Score:", get_memory_score([1, 2, 2, 2, 2, 3, 1, 1, 8, 2]))
print("3. Score:", get_memory_score([2, 2, 2, 2, 2, 2, 2, 2, 2, 2]))
print("4. Score:", get_memory_score([1, 2, 3, 4, 5, 6, 7, 8, 9]))
random_nums5 = [7, 5, 8, 6, 3, 5, 9, 7, 9, 7, 5, 6, 4, 1, 7, 4, 6, 5, 8, 9, 4, 8, 3, 0, 3]
print("5. Score:", get_memory_score(random_nums5))

prints:
1. Score: 4
2. Score: 6
3. Score: 8
4. Score: 0
5. Score: 10

```python
def get_memory_score(random_numbers):
    return 0
```
Define the `get_most_recent()` function which is passed two lists of numbers as parameters:

- a list of numbers which are in order from the least recent to the most recent, i.e., the number at the end of the list is the most recent, and
- a list of numbers to test - the numbers in this list may or may not be elements of the first parameter list.

This function returns the number from the "list of numbers to test" which occurred most recently in the first parameter list (i.e., is closest to the end of the list). If none of the numbers in the "numbers to test" list occurred in the first parameter list, the function should return -1. For example, the following code:

```python
print("1.", get_most_recent([0, 1, 2, 0, 3, 4, 1], [2, 0, 3]))
print("2.", get_most_recent([0, 1, 2, 0, 3, 4, 1], [0, 7, 2]))
print("3.", get_most_recent([0, 1, 2, 8, 9, 0, 3, 4, 6], [1, 9, 2, 8]))
print("4.", get_most_recent([4, 1, 4, 5, 4, 1], [0, 7, 3]))
print("5.", get_most_recent([8, 1, 2, 0, 8, 4, 1], [8, 7, 3]))
print("6.", get_most_recent([], [8, 1, 0, 3]))
numbers_in_order = [1, 1, 1, 0, 1, 0, 2, 2, 1, 2, 0, 1, 2, 0, 3, 4, 1, 2, 4, 0, 3, 8, 8, 5, 5]
print("7.", get_most_recent(numbers_in_order, [1, 0, 3, 4]))
numbers_in_order = [1, 2, 2, 2, 2, 3, 1, 3, 8, 0]
print("8.", get_most_recent(numbers_in_order, [1, 8, 2, 3, 4, 2]))
```

prints:

1. 3
2. 0
3. 9
4. -1
5. 8
6. -1
7. 3
8. 8

```python
def get_most_recent(numbers, numbers_to_test):
    return 0
```
Define the is_a_valid_code() function which is passed a string as a parameter. The function returns a boolean indicating whether the parameter string is a valid code or not. A valid code is a string made up of one letter followed by one or more digits (can also include spaces before, between or after the digits). The first three lines of code inside the function should be:

```python
code_letters = ['S', 'B', 'N', 'T', 'P']
min_for_each_letter = [1, 3, 4, 0, 3]  # inclusive
max_for_each_letter = [7, 9, 6, 7, 5]  # inclusive
```

where:
- `code_letters` is the list of code letters which are valid for the first letter of the code string,
- `min_for_each_letter` is a list which contains the minimum number (inclusive) for each digit following that letter,
- `max_for_each_letter` is a list which contains the maximum number (inclusive) for each digit following that letter.

For example, the third element of the `code_letters` list is the letter 'N', the corresponding third element of the `min_for_each_letter` list is 4 and the corresponding third element of the `max_for_each_letter` list is 6. This indicates that the code digits which follow the letter 'N' can be any number made up of the digits 4, 5 or 6. The number part of a valid code string can also contain any number of spaces.

**Note:** The number part of a parameter code string to be tested could contain an alphabetic character thus making the code not valid. You will find it useful to use the string method, isdigit(), which returns True if a string is a digit, False otherwise.

For example, the following code:

```python
print("1.", is_a_valid_code('B747346'))
print("2.", is_a_valid_code('N  444  454'))
print("3.", is_a_valid_code('T 400 4854'))
print("4.", is_a_valid_code('S  444S454'))
print("5.", is_a_valid_code('P  '))
print("6.", is_a_valid_code('T  0 '))
```

prints:

1. True
2. True
3. False
4. False
5. False
6. True

```python
def is_a_valid_code(code_string):
    code_letters = ['S', 'B', 'N', 'T', 'P']
    min_for_each_letter = [1, 3, 4, 0, 3]  # inclusive
    max_for_each_letter = [7, 9, 6, 7, 5]  # inclusive

    return True
```
Define the get_longest_e_word() function which is passed a list of strings as a parameter. The function returns the word in the list which has the most characters (i.e., the longest word) BUT only words which have 6 or more characters and contain the letter 'e' (or 'E') are considered. If two or more words in the list have the same number of characters as the longest word and both contain the letter 'e' (or 'E'), the function should return the last word from the start of the list which has the most characters.

If the parameter list is empty or if there are no 6 letter or longer words in the list which contain the letter 'e' (or 'E'), the function should return the empty string. For example, the following code:

```python
def get_longest_e_word(word_list):
    return ""
```
Remove triplets made up of three sequential identical elements - 5 marks

Define the `remove_triplets()` function which is passed a list of integers as a parameter. The function removes all triplets from the list (i.e., removes any three elements in the list which are exactly the same and are in sequence). For example, the following code:

```python
def remove_triplets(a_list):
    pass
```

```
a_list = [6, 6, 6, 7, 6, 6, 6, 3, 3, 3, 8, 8, 8, 3]
remove_triplets(a_list)
print("1.", a_list)

a_list = [6, 6, 6, 7, 6, 6, 6, 6, 6]
remove_triplets(a_list)
print("2.", a_list)

a_list = [6, 6, 6, 7, 6, 6, 4, 3, 3, 3, 8, 8, 8, 3]
remove_triplets(a_list)
print("3.", a_list)

a_list = [1, 1, 1, 4, 4, 4, 1, 1, 1]
remove_triplets(a_list)
print("4.", a_list)

a_list = [1, 1, 2, 1, 2, 2]
remove_triplets(a_list)
print("5.", a_list)
```

prints:

1. [7, 3]
2. [7, 6, 6]
3. [7, 6, 6, 4, 3]
4. []
5. [1, 1, 2, 1, 2, 2]

```python
def remove_triplets(a_list):
    pass
```
In a dice rolling game a player’s hand is made up of any number of random dice throws and is valued in the following way:

- In this game a run is a sequence of dice values starting from 1, e.g., 123, 12345, 1234, 1.
- Each dice which is part of a run of dice starting from a 1 has a value which is equivalent to the dice number. The value of any dice which is part of a run is added to the hand score.
- If there is no 1 in a hand of dice, the score for the whole hand is 0.
- A hand of dice can contain more than one run.

Study the following five example hands of dice and their corresponding valuation. Make sure you understand how the hands are valued:

- [5, 3, 2, 5, 4, 5, 6, 4, 3] has value 0
- [3, 4, 1, 5, 3, 1, 4, 6] has value 2 (contains one run with just the dice [1] and a second run with just [1])
- [5, 3, 2, 2, 6, 4, 5, 1, 4] has value 21 (contains one run with the dice [1, 2, 3, 4, 5, 6])
- [2, 1, 1, 1, 2, 3, 3, 1, 3, 2] has value 19 (contains three separate runs with the dice [1, 2, 3] and a second run with the dice [1]
- [3, 4, 1, 5, 2, 1, 5, 1, 2, 3, 4, 6] has value 37 (contains one run with the dice [1, 2, 3, 4, 5, 6], a second run with [1, 2, 3, 4, 5] and a third run with the dice [1])

Complete the get_dice_score() function which is passed a list of dice throws and returns the value of the hand according to the rules described above.

```python
def get_dice_score(list_of_dice):
    return 0
```