219114/115 Programming I

Exercise 5

1. **Docstring and doctest (doctest_ex.py)**

Implement each of the following functions and include Google's style docstring and put at least **five normal test cases** in the doctest. In addition, your code needs to **raise appropriate exceptions** and **exception test cases** needs to be included in the doctest as well.

1.1. Create a function:

def string_interleave(s1, s2)

that, start with the first character from the larger of the two strings s1 and s2, take each character from the smaller string from index 0 on and interleave it with each character from the larger string. Return the new interleaved string.

Examples:

string_interleave("abc", “mnopq") # return ’manbocpq'

string_interleave("mnopq", “abc") # return ’manbocpq’

string_interleave("Hello", "Sawasdee Thailand”) # return ’SHaewlalsodee Thailand’

string_interleave("Mine", “Thai") # return ’TMhianie’

1.2. Create a function:

def selective_sum(n, k)

that returns the sum of the k largest digits of n

Examples:

selective_sum(3018, 2) # return 11 as 3 and 8 are the 2 largest digits (larger than 0 and 1)

selective_sum(593796, 3) # return 25 as 9, 9, and 7 are the 3 largest digits

selective_sum(12345, 10) # return 15 as 10 is larger than the number of digits in 12345

1.3. Create a function:

def list_intersect(l1, l2)

that, given l1 and l2 are lists, returns the intersection list of l1 and l2. The intersection list contains elements that are in both l1 and contains no duplicate elements.

Examples:

list_intersect([1, 2, 1, 3, 4], [1, 2, 2, 3, 4]) # return [1, 2, 3, 4]

list_intersect([1, 2, 3, 4], [1, 2, 3, 4, 5, 6, 7, 8]) # return [1, 2, 3, 4]

list_intersect([9, 10, 11, 12], [5, 6, 7, 8]) # return []

list_intersect([9, 10, 11, 12], [5, 6, 9, 10, 7, 8]) # return [9, 10]

2. Tic-Tac-Toe (tic_tac_toe_completed.py)

Write a complete program for a two-player game Tic-Tac-Toe. You should study and build on the starting code from tic_tac_toe.py.

- In each turn, a player puts in a number 1 to 9 to place the X or O symbol in one of the nine squares.
- If an illegal input is received, the player is repeatedly asked to provide a new one until a legal input is received.
- A legal input is a **number from 1 to 9 the represents a square that is not occupied.**
- The game ends with a win when one of the players can obtain a winning arrangement or a tie when all squares are occupied and no one wins.

The following is a sequence of interactions with the completed Tic-Tac-Toe program.

Example 1:

```
Starting Tic Tac Toe

      1|2|3
      -+-+-
      4|5|6
      -+-+-
      7|8|9

       | |
      -+-+-
       | |
      -+-+-
       | |
Input a number 1 to 9 to place X in one of the nine squares: 1

      1|2|3
      -+-+-
      4|5|6
      -+-+-
      7|8|9

      X| |
      -+-+-
       | |
      -+-+-
       | |
Input a number 1 to 9 to place O in one of the nine squares: 1
Input a number 1 to 9 to place O in one of the nine squares: 2

      1|2|3
      -+-+-
      4|5|6
      -+-+-
      7|8|9

      X|O|
      -+-+-
       | |
      -+-+-
       | |
Input a number 1 to 9 to place X in one of the nine squares: T
Input a number 1 to 9 to place X in one of the nine squares: 5

      1|2|3
      -+-+-
      4|5|6
      -+-+-
      7|8|9
```

```
      X|O|
      -+-+-
       |X|
      -+-+-
       | |
Input a number 1 to 9 to place O in one of the nine squares: 8

      1|2|3
      -+-+-
      4|5|6
      -+-+-
      7|8|9

      X|O|
      -+-+-
       |X|
      -+-+-
       |O|
Input a number 1 to 9 to place X in one of the nine squares: 9

      1|2|3
      -+-+-
      4|5|6
      -+-+-
      7|8|9

      X|O|
      -+-+-
       |X|
      -+-+-
       |O|X

X wins.
```

Example 2:

```
Starting Tic Tac Toe

       1|2|3
       -+-+-
       4|5|6
       -+-+-
       7|8|9

        | |
       -+-+-
        | |
       -+-+-
        | |
Input a number 1 to 9 to place X in one of the nine squares: 1

       1|2|3
       -+-+-
       4|5|6
       -+-+-
       7|8|9

       X| |
       -+-+-
        | |
       -+-+-
        | |
```

```
Input a number 1 to 9 to place O in one of the nine squares: 5

      1|2|3
      -+-+-
      4|5|6
      -+-+-
      7|8|9

      X| |
      -+-+-
       |O|
      -+-+-
       | |
Input a number 1 to 9 to place X in one of the nine squares: 3

      1|2|3
      -+-+-
      4|5|6
      -+-+-
      7|8|9

      X| |X
      -+-+-
       |O|
      -+-+-
       | |
Input a number 1 to 9 to place O in one of the nine squares: 2

      1|2|3
      -+-+-
      4|5|6
      -+-+-
      7|8|9

      X|O|X
      -+-+-
       |O|
      -+-+-
       | |
Input a number 1 to 9 to place X in one of the nine squares: 8

      1|2|3
      -+-+-
      4|5|6
      -+-+-
      7|8|9

      X|O|X
      -+-+-
       |O|
      -+-+-
       |X|
Input a number 1 to 9 to place O in one of the nine squares: 4

      1|2|3
      -+-+-
      4|5|6
      -+-+-
      7|8|9
```

```
      X|O|X
      -+-+-
      O|O|
      -+-+-
       |X|
Input a number 1 to 9 to place X in one of the nine squares: 6

      1|2|3
      -+-+-
      4|5|6
      -+-+-
      7|8|9

      X|O|X
      -+-+-
      O|O|X
      -+-+-
       |X|
Input a number 1 to 9 to place O in one of the nine squares: 9

      1|2|3
      -+-+-
      4|5|6
      -+-+-
      7|8|9

      X|O|X
      -+-+-
      O|O|X
      -+-+-
       |X|O
Input a number 1 to 9 to place X in one of the nine squares: 7

      1|2|3
      -+-+-
      4|5|6
      -+-+-
      7|8|9

      X|O|X
      -+-+-
      O|O|X
      -+-+-
      X|X|O

Both tie.
```

Submission:

- ***Create StudentID_Firstname_ex5 folder, where StudentID is your KU ID and Firstname is your given name***
- ***Put the files to submit, doctest_ex.py and tic_tac_toe_completed.py, into this folder***
- ***Zip the folder and submit the zip file to the course's Google Classroom before the due date***

Grading:

1. Correctness (50%); your code must run and produce correct outcomes; code that does not run because of, for example, syntax errors or name misspelling receives zero credit.

2. Cleanliness (50%): your code must be clean, following PEP 8 style guide; variable names must be meaningful, following PEP 8 convention; comments must be put in for others to be able to read and understand your code, again following PEP 8 convention.