Laboratory 05 — Processing text files using loops with conditions

Topics covered:

- Reading files
- Splitting strings
- Processing files using loops with conditions

PREPARATION

Lab attendance is compulsory. You will receive 1 mark for being present at the start of the lab and staying at least until the tutor has finished introducing the lab and has signed your attendance sheet.

EXERCISES

The following exercises must be completed during your allocated laboratory time. You must show your work to the laboratory tutor who will sign off when the work is completed correctly.

EXERCISE 5.1

[2 marks] Write the `print_even()` function which takes a list of numbers as a parameter and prints all the even numbers from the list.

Arguments: a list of numbers (integer)

Prints: even numbers from a list of numbers

Sample output:

```
>>> print_even([4, 1, 3, 2, 7])
4
2
>>> print_even([])
```

EXERCISE 5.2

[2 marks] Write the `print_short()` function which takes a list of strings as a parameter and prints the strings which are less than four characters long.

Arguments: a list of strings

Prints: the strings with less than four characters

Sample output:

```
>>> print_short(['Welcome', 'to', 'COMPSCI101'])
to
>>> print_short(['Monday', 'Mon', 'Sunday', 'Sun'])
Mon
Sun
```

EXERCISE 5.3

[2 marks] Write the `count_names_in_file()` function which takes a filename as a parameter and returns the number of names in a text file. The file named ‘names.txt’ contains many names, separated by commas.

Arguments: an input filename

Returns: the number of names

Sample contents of input file:

```
andrew,ann,peter,angela,pat,patricia
```

Sample output:

```
>>> count_names_in_file("names.txt")
6
```

EXERCISE 5.4

[3 marks] Write the `find_words()` function which takes a character and a filename as parameters and prints all words in the file which contain the specified character.

Arguments: the specified character and an input filename

Prints: prints all words in the file which contain the specified character

Sample contents of input file:

```
andrew,ann,peter,angela,pat,patricia
```

Sample output:

```
>>> find_words("n", "names.txt")
andrew
ann
angela
>>> find_words("e", "names.txt")
andrew
peter
angela
```

HOMEWORK EXERCISES

The following exercises must be completed prior to the start of your Lab 6 session. Include all the exercises in a single module (file), named "Lab05_Homework.py". Your file must include a docstring at the top of the file containing your name, UPI and ID number. You must submit the file containing your exercises using the Assignment Dropbox before the start of Lab 06.

EXERCISE 5.5

[5 marks] Write the `unique_list` function which takes a list of strings as input and returns unique values in the list.

Arguments: a list of strings

Returns: a list which contains unique strings.

Other knowledge: use the **`in`** boolean operator to check for membership.

Sample output:

```
>>> unique_list(['cat', 'dog', 'cat', 'bug', 'dog', 'ant', 'dog', 'bug'])
['cat', 'dog', 'bug', 'ant']

>>> unique_list(['Welcome', 'to', 'COMPSCI101', 'To'])
['Welcome', 'to', 'COMPSCI101', 'To']
```

EXERCISE 5.6

[5 marks] Suppose that a text file contains an unspecified number of scores. Write the `average_from_file()` function which takes a filename as input, reads the scores from the file, and returns the average mark rounded to 1 decimal place. Scores are separated by blanks.

Arguments: an input filename

Returns: the average score (float)

Sample contents of input file:

```
56 78 32 24
```

Sample output:

```
>>> average_from_file("marks.txt")
47.5
```

ADVANCED EXERCISES (OPTIONAL)

EXERCISE 5.7

[0 marks] Write a `replace_text()` function which takes 3 parameters: the name of a file, an old string and a new string and replaces all occurrences of the old string in the file contents with the new string and prints the contents to the screen.

Arguments: an input filename, an old string and a new string

Other Knowledge: You will need to use the replace() method.

Sample contents of input file:

```
The woods are lovely dark and deep
But I have promises to keep
And miles to go before I sleep
And miles to go before I sleep
```

Sample output:

```
>>> replace_text("words.txt", "go", "think")
The woods are lovely dark and deep
But I have promises to keep
And miles to think before I sleep
And miles to think before I sleep
```

EXERCISE 5.8

[0 marks] Write the `distribution()` function which takes a filename and a list of valid grades as parameters and prints a table of the distribution of grades. This one-line file will contain letter grades separated by blanks.

Arguments: an input filename and a list of valid grades

Sample contents of input file:

```
A F D C A A B B B C F
```

Sample output:

```
>>> distribution("grades.txt", ['A', 'B', 'C', 'D', 'E', 'F'])
3 students got A
3 students got B
2 students got C
1 student got D
2 students got F
```

ASSESSMENT

Name:____

Lab day and time: ____

Check list for laboratory exercises (to be completed by Lab tutor)

On time: □ (1 mark)

Exercise 5.1: □ (2 marks)

Exercise 5.2: □ (2 marks)

Exercise 5.3: □ (2 marks)

Exercise 5.4: □ (3 marks)

Teaching Assistant: ______________

Total mark: ____________________/10 Tutor: __________________________