CENG 310

ALGORITHMS AND DATA STRUCTURES WITH PYTHON

Spring 2022-2023

Homework 1 - Python Practice

Due Date: 28/03/2023 23:59

Instructions. In this assignment you will complete basic python tasks by writing python code. Your codes should be written by using Python3. You may use built in functions. There will be 3 different tasks you should complete. In those tasks do not print unnecessary information since it will affect the grading.

Submissions. Submit your codes as a python file through odtuclass. E.g. "1234567.py"

1　Task 1

Given radius r of circular base and height h of a cone calculate the volume of the cone by using the following formula.

$$Volume = \frac{\pi r^2 h}{3} \tag{1}$$

Specifications:

- You will implement a function named *volumeCalculator* with 2 parameters, namely the radius and height. The function will return the result.

- The arguments will be in the following order: radius (float) and height (float).

- The **return** value will be a float. **Do not** print the result.

- Your function must have the same name and must preserve the order of arguments for us to grade without any trouble

- Import the value of π by using *math* library.

```
Sample Input:
>>> volumeCalculator(2.0, 4.0)

Sample Output:
16.755160819145562
```

2   Task 2

In this task, you need to define a function named printAllSubsets(list1, list2) where list1 is a list that contains integers and list2 is a list of lists of integers. A set will be represented as a list of integers that can be empty, in other words, empty list will correspond to empty set, and can not contain an element more than once, i.e. [1,2,2,3] is **not** a valid set. Your job is to print all subsets of list1 that are inside of list2.

For Example:

```
Sample Input:
>>> printAllSubsets([1,2,3,4], [[], [1], [3,4], [3,1], [0,1,2,3], [2,3,4,5]])

Sample Output:
[]
[1]
[3, 4]
[3, 1]
```

Specifications:

- You need to print the subsets **directly**, do not try to print the sets by using strings, i.e,

```
print("[" + str(1) + "]")
```

- Put a *newline* character after each subset.

- list1 will not be given as an empty set and there will always be at least 1 subset of list1 in list2.

- Preserve the order of subsets while printing.

3   Task 3

In this task, you will be given a txt file which contains record about employees. The file consists of a unique ID number, Name, Surname, Job, and Age fields for each person. You will implement a function named queryTxt(filename, mode, field, Value) where

- **filename** is the name of the file

- **mode** is either "search" or "sort by"

- **field** is the field that needs to be searched or to be used for sorting

- **Value** is the value that is either searched in the given field or one of "ascending" or "descending" to indicate the sorting order.

For Example assume we have the following "simplefile.txt" file:

```
12 Ali Doğru Manager 25
24 Veli Yanlış Secretary 29
30 Selami Selam Intern 20
27 John Doe Intern 20

After we call
>>> queryTxt("simplefile.txt", "search", "Age", 20)

30 Selami Selam Intern 20
27 John Doe Intern 20

or If we call
>>> queryTxt("simplefile.txt", "sort by", "ID number", "ascending")

12 Ali Doğru Manager 25
24 Veli Yanlış Secretary 29
27 John Doe Intern 20
30 Selami Selam Intern 20
```

Specifications:

- Field names will be one of "ID number" (int), "Name" (str), "Surname" (str), "Job" (str) and "Age" (int).

- In case of a search, your function needs to print every match. If there is no match simply return "Empty". While searching keep the original order of entries given in the txt file.

- Sort by can only be done for fields "ID number" and "Age". Note that there wont be people with same age if sorting is done for "Age" field to simplify the task.

- Every field of a person will be separated with a single white space character.

- Every person entry will be separated with a newline character.

- While printing put a newline character after each person entry.

- There will not be an empty line in the txt file.

- Your function must have the same name and preserve the order of arguments for us to grade without any trouble