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Python Advanced (not really advanced, coz it is InLab. Thank me later! :))

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Submission Guidelines for assignment

1. In the file readme.txt in the team-name directory, which contains the contribution of each team member, roll number and references (cite where you get code/code snippets from).
2. Rename the directory team-name to actual team name instead of
E.g. Coders
3. Compress the directory to <team_name>.tar.gz
e.g. coders.tar.gz
4. Submit one assignment per team. Please.

Problem 1

Write a program in python which will take n numbers as input (on stdin) and print on separate lines whether the number is a square number or not. You need to implement a function isSquare() which prints whether a number is a square or not. Don't use any library.

Input format:

The first line contains n, the number of integers.

The next line contains the n integers.

Sample Input:

```
5
4 9 8 7 1
```

Note: Strictly follow the input format

Expected Output:

```
4 is a square number
9 is a square number
8 is not a square number
7 is not a square number
1 is a square number
```

Problem 2

Sherlock has designed security software in his favourite language Python (see Q2.py). It takes a pin (integer) ranging from 0 to 9999 as input and if it is correct the safe gets opened. If you get the pin wrong once, you get another chance. If you miss it again, the software goes into full alarm mode (prints "Full alarm").

Sample interaction:

```
Enter the pin: 1234
Wrong PIN! Try again
Enter the pin: 0911
Full alarm
```

His arch-nemesis, Jim Moriarty finds a flaw in his code and figures out if he gets the pin wrong at the first try, he can enter a string, which makes the program crash.

Enter the pin: 1234

Wrong PIN! Try again

Enter the pin: Sherlock is dumb

Program crashes

Then he starts the program again and tries a new pin, till he gets the correct one. Sherlock's assistant Dr Watson, not being a brilliant programmer like yourself, asks you to add some changes to the code, so that, no matter what Jim Moriarty does, the program goes into Full alarm on any illegal input.

Hint: Dr. Watson mentions that Sherlock never studied the chapter for Exception Handling when he studied Python.

NOTE: You must edit Q2.py and submit it.

Clarifications :

1. You should output full alarm on illegal input on any trial (both 1st and 2nd) and exit the code.
2. 04949 should be converted to 4949 and then proceed further. So it should NOT give a FULL ALARM
3. Do not write shell scripts and then use `os.system("bash ...")`

Problem 3

Read a string as input from stdin and find the count of each character in the string and print in each line a character along with its count separated by a colon and a space in decreasing order of frequency, and in case of ambiguity further, by the decreasing ASCII order of the character. The string may have non-alphabetic characters.

Hint: Use a 'dictionary'

Input:
apple

Output:
p: 2
l: 1
e: 1
a: 1

Since, l > e > a as per their ASCII orders.

Problem 4

NOTE: CREATE YOUR OWN FILE AS SHOWN IN THE INPUT FORMAT

You all know that IITB follows the credit system, so at the end of every semester, we need to calculate the CPI to analyze the performance of students.

Write a python program to calculate the CPI of a set of students given their grades in the courses they took and the credits per course.

Create a class named Student with,

1. a class variable num_students (to keep track of how many Student instances have been created) and,
2. instance variables grades and credits both of type list (of integers), and any extra ones
3. member function CPI(), and any extra ones you may require.

Implement a constructor to initialize the variables.

Assume that grades and credits are all positive integers.

Input format:

Grades and credits of each student occur on 2 separate lines.

The string "---" acts as a delimiter between students. The final student's info is NOT followed by the delimiter.

Example:

```
8 6 7 9 8
6 6 6 6 8
---
8 8 8 8 8
6 6 6 6 8
---
10 9 7 7
8 6 6 7
```

The input file is given as an argument to the python script

Usage : python3 Q4.py <input_file>

Output format:

Print the total number of students using the class variable followed by the overall CPI of each student one per line in the order the students were input. Print up to 4 decimal points for the CPI of a student.

(up to 4 decimals implies that you round it to four decimals)

Problem 5

Dr. Strange knows that Thanos is coming for the Time Stone. He knows that Iron Man, Black Widow, Hulk, Thor, Captain America, War Machine, Captain Marvel, Hawkeye etc. are the only hope to stop Thanos.

To save them Dr. Strange asks for your help. He gives you a file (heroes.txt) with the name of the heroes he needs to save and a directory (avengers_Universe) full of files. Some of the files inside the directory contain the names of these heroes.

You need to find those files and move them to a new directory (inside data/) named **survivors_of_snap**.

Before Dr. Strange leaves for the fight, he says, "Make good use of the os library".
(make this directory on the execution of the python script)

The future of the Avengers Universe is in your hands, "the coding avenger"

TL;DR ;) :P

Given a directory of files, find the files which have a keyword present in them amongst a list of keywords. Create a new directory and move those files in that directory.

Assume that,

1. Each file will have only one keyword.
2. A keyword appears only once in the directory.
3. In each file, only one line will contain the keyword and that line will contain no word other than that keyword.

NOTE: Use relative paths, not absolute paths.

WRONG: Absolute path:

/home/diptesh/CS699TA/PyAd/InLab3/data/avengers_universe

CORRECT: Relative path: ./data/avengers_universe

Sample file from Avengers_Universe

Line1

Line2

Iron_Man

Line 4

...

Note :

1. Assume heroes.txt is inside the Data folder and use its path in your script.