Title	Assignment 7
Due	30-Apr-2012 17:00
Number of resubmissions allowed	0
Grade	**100.0 (max 100.0)**
Modified by instructor	19-Apr-2012 17:55

Instructions

This tutorial is about lists and dictionaries.

Question 1

Write a Python program where the user can enter a list of strings followed by the sentinel "DONE" and the list of strings is then printed out right-aligned with the longest string.

Sample I/O:

```
Enter strings (end with DONE):
Stuart
Masixole
Milan
Joachim
Hanan
Caitlin
Molefe
Jason
Jacob
Mbongeni
DONE

Right-aligned list:
  Stuart
Masixole
   Milan
 Joachim
   Hanan
 Caitlin
  Molefe
   Jason
   Jacob
Mbongeni
```

Save your program as **question1.py**. Submit all source files only.

Question 2

Write a program to do basic vector calculations in 3 dimensions: addition, dot product and normalization.

A vector has 3 component values, such as (1, 3, 2) and is naturally storable as an array. Addition of vectors requires addition of the corresponding elements. A dot product is the sum of the products of corresponding elements. The norm of a single vector is the square root of the sum of the squares of the elements.

Suppose that we have 2 vectors: A=(1, 3, 2) and B=(2, 3, 0). Then,

A+B = (1+2, 3+3, 2+0) = (3, 6, 2)

A.B = 1.2 + 3.3 + 2.0 = 2 + 9 = 11

|A| = Sqrt(1^2 + 3^2 + 2^2) = Sqrt(1+9+4) = Sqrt(14) = 3.74

|B| = Sqrt(2^2 + 3^2 + 0^2) = Sqrt(4+9+0) = Sqrt(13) = 3.61

For the norms, print your answer to 2 decimal positions.

Sample I/O:

```
Enter vector A:
1 3 2
Enter vector B:
2 3 0
A+B = [3, 6, 2]
A.B = 11
|A| = 3.74
|B| = 3.61
```

Save your program as **question2.py**. Submit all source files only.

Question 3

Write a program to count the number of votes for each political party in an election. Your program must accept a sequence of names of parties (terminated by the word DONE) and keep track of the votes per party. There is no pre-determined party list so the list must be created as party names are encountered.

At the end of the program, print out the names of the parties and their vote counts, with the parties listed in sorted order (the default order of the *sorted* function). Format party names in a field with width=10 to create the effect of columns - assume all party names are at most 10 characters wide.

Sample I/O:

```
Independent Electoral Commission
--------------------------------
Enter the names of parties (terminated by DONE):
apples
oranges
oranges
oranges
pears
bananas
bananas
kiwis
oranges
apples
oranges
```

```
DONE

Vote counts:
apples     - 2
bananas    - 2
kiwis      - 1
oranges    - 5
pears      - 1
```

Save your program as **question3.py**. Submit all source files only.

Question 4

Write a program to check if a complete **Sudoku** grid is valid or not.

A Sudoku grid is a 9x9 grid of integers, with each cell containing an integer value from 1-9. The input to your program is a set of nine lines, each containing 9 single digit integers with no intervening spaces. Your program must store these integers internally in a 2-dimensional array.

In a correct Sudoku solution, the following conditions hold:

- no 2 cells in the same row have the same value
- no 2 cells in the same column have the same value
- no 2 cells in the same 3x3 sub-grid have the same value - this is tested for the 9 non-overlapping sub-grids that a 9x9 grid can be divided into

Sample I/O:

```
359716482
867345912
413928675
398574126
546281739
172639548
984163257
621857394
735492861
Sudoku grid is not valid
```

Sample I/O:

```
259716483
867345912
413928675
398574126
546281739
172639548
984163257
621857394
735492861
Sudoku grid is valid
```

Save your program as **question4.py**. Submit all source files only.

Mark Weighting

Question 1 : 20
Question 2 : 25
Question 3 : 25
Question 3 : 30

Submission

This assignment does not accept online submissions. Contact your instructor for additional instructions.

Done