Machine Learning Workshop 1 – CSE 2793

MINOR ASSIGNMENT-5: LISTS, TUPLES, DICTIONARIES AND SETS

Q 01 Write a Python program to create a list of integers of size N and store random values in it. Find and display the sum and average. Create two more lists that contain the even and odd values from this list.

Q 02 Write a Python program using a list that reads the integers between 1 and 100 and counts the occurrences of each. Assume the input ends with 0.

Here is a sample run of the program:

```
Enter the integers between 1 and 100: 2 5 6 5 4 3 23 43 2 0
2 occurs 2 times
3 occurs 1 time
4 occurs 1 time
5 occurs 2 times
6 occurs 1 time
23 occurs 1 time
43 occurs 1 time
```

Note that if a number occurs more than one time, the plural word "times" is used in the output.

Q 03 Write a function that finds the smallest element in a list of double values. Write a Python program that prompts the user to enter ten numbers, invokes this function to return the minimum value, and displays the minimum value.

Here is a sample run of the program:

```
Enter ten numbers: 1.9 2.5 3.7 2 1.5 6 3 4 5 2
The minimum number is: 1.5
```

Q 04 Define a function that eliminates the duplicate values in the list. Write a Python program that reads in ten integers, invokes the method, and displays the result.

Here is the sample run of the program:

```
Enter ten numbers: 1 2 3 2 1 6 3 4 5 2

The distinct numbers are: 1 2 3 6 4 5
```

Q 05 Define a function that returns the sum of all the elements in a specified column in a matrix. Write a Python program that reads a 3-by-4 matrix and displays the sum of each column.

Here is a sample run:

```
Enter a 3-by-4 matrix row by row:
1.5   2   3   4
```

```
5.5   6   7   8
9.5   1   3   1

Sum of the elements at column 0 is 16.5
Sum of the elements at column 1 is 9.0
Sum of the elements at column 2 is 13.0
Sum of the elements at column 3 is 13.0
```

Q 06 Define a function to add two matrices. In order to be added, the two matrices must have the same dimensions and the same or compatible types of elements. Let c be the resulting matrix. Each element c_{ij} is $a_{ij} + b_{ij}$. For example, for two 3 * 3 matrices a and b, c is

$$\begin{pmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{pmatrix} + \begin{pmatrix} b_{11} & b_{12} & b_{13} \\ b_{21} & b_{22} & b_{23} \\ b_{31} & b_{32} & b_{33} \end{pmatrix} = \begin{pmatrix} a_{11}+b_{11} & a_{12}+b_{12} & a_{13}+b_{13} \\ a_{21}+b_{21} & a_{22}+b_{22} & a_{23}+b_{23} \\ a_{31}+b_{31} & a_{32}+b_{32} & a_{33}+b_{33} \end{pmatrix}$$

Write a Python program that prompts the user to enter two 3 * 3 matrices and displays their sum.

Q 07 Define a function to multiply two matrices.
For example, for two 3 * 3 matrices a and b, c is

$$\begin{pmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{pmatrix} \times \begin{pmatrix} b_{11} & b_{12} & b_{13} \\ b_{21} & b_{22} & b_{23} \\ b_{31} & b_{32} & b_{33} \end{pmatrix} = \begin{pmatrix} c_{11} & c_{12} & c_{13} \\ c_{21} & c_{22} & c_{23} \\ c_{31} & c_{32} & c_{33} \end{pmatrix}$$

where $c_{ij} = a_{i1} * b_{1j} + a_{i2} * b_{2j} + a_{i3} * b_{3j}$.
Write a Python program that prompts the user to enter two 3 * 3 matrices and displays their product.

Q 08 Write a Python program that randomly fills in 0s and 1s into a 4-by-4 matrix, prints the matrix, and finds the first row and column with the most 1s.

Here is a sample run of the program:

```
0 0 1 1
0 0 1 1
1 1 0 1
1 0 1 0

The largest row index: 2
The largest column index: 2
```

Q 09 You are supposed to remove duplicate entries from a list. The constraint is that the original order should be preserved. Write function **`remove_duplicates(values)`**.

Q 10 Given two lists of numbers, each sorted in ascending order, merge them into a result list according to their order. Write function **`mergeList(values1, values2).`**

Here are some test cases:

Input 1	Input 2	Result
1, 4, 7, 12, 20	10, 15, 17, 33	1, 4, 7, 10, 12, 15, 17, 20, 33
2, 3, 5, 7	11, 13, 17	2, 3, 5, 7, 11, 13, 17
2, 3, 5, 7, 11	7, 11, 13, 17	2, 3, 5, 7, 7, 11, 11, 13, 17
[1, 2, 3]	∅ = []	[1, 2, 3]

Q 11 Write function **`is_magic_triangle(values)`** that checks whether a sequence of numbers forms a magic triangle. Such a triangle is defined as one where the respective sums of the three sides' values must all be equal. The sequence of numbers must be entered in the form of a list.

Here is a sample run:

```
>>> is_magic6([1, 5, 3, 4, 2, 6])
True

>>> is_magic6([1, 2, 3, 4, 5, 6])
False
```

Q 12 Create a tuple containing the names of five countries and display the whole tuple. Ask the user to enter one of the countries that have been shown to them and then display the index number (i.e. position in the list) of that item in the tuple.

Q 13 Add to program in Q 12 to ask the user to enter a number and display the country in that position.

Q 14 Write a program that prints up to n^{th} Fibonacci number by using a dictionary.

Q 15 Write a program that prints a histogram of frequencies of characters occurring in a message supplied by the user.