Lab 7: Lists, Tuples and Dictionaries

Recall that labs 5 and 6 were on functions. In today's lab session, we will focus on three more core data types in python: List, Tuple and Dictionary. At the end of the lab session, you will be able to:

- Create objects of type List, Tuple and Dictionary.
- Use the aforementioned data types to solve given problems.

Activity 1: Recap

1. Differentiate between *mutable* and *immutable* data types.
2. What are lists? List some operations on lists? How about the functions/methods on lists?
3. What are tuples? Some operations? Functions/methods on tuples?
4. What are dictionaries? Operations and functions/methods on them?

Additional resources: w3schools.com, python.org, pythontutor.com (for visualization)

Activity 2: Hands-on

1. Create a list of any 10 integer numbers.

    a. Print the total number of elements in the list.
    b. Print the first, the middle, and the last elements of the list.
    c. Arrange the list in increasing order of the numbers.
    d. Extract and display the first 6 elements of the list. How about just the last four?
    e. Display the frequency (number of occurrence) of each element of the list.
    f. Display individual elements of the list as:
    Element 1 is = <1st element of your list>
    Element 2 is = <2nd element of your list> and so on.
    g. Display the square root of each element of your list.
    h. Print the largest and smallest elements of the list.
    i. Display only the **even** elements of the list.
    j. Print the *sum* of the elements of the list.
    k. Print the *average* of the elements of the list.

2. Create a 2x2 matrix of numbers.
    a. Print all the elements of the matrix.
    b. Display each element of the matrix using their indexes.

3. List comprehension
    a. Generate a list of numbers from 1 to 100.
    b. Generate a list of the square root of all numbers from 1 to 100.
    c. Generate a list of **even** numbers from 1 to 100.

4. Write a program that finds the maximum of 4 user-supplied numbers (using lists).

5. Create a **tuple** of any 10 numbers.

    a. Find the total number of elements in the tuple.
    b. Try to replace the first element of the tuple by a new element.
    c. Experiment with slicing in tuples.
    d. Display individual elements of the tuple.
    e. Find the sum of all the numbers in the tuple.

6. Create a **dictionary** mapping of some of your personal details such as name, phoneNo, age, gender, Dzongkhag, favorite color, and languages .

    a. Display the dictionary.
    b. Display only the keys of the dictionary. How about only the values?
    c. Add a new entry named hobby.
    d. Suppose you have learned new language recently. Modify the existing language entry by including the new one.
    e. Delete the information related to your age.

7. Write a *dictionary-based* program that does English-to-Dzongkha translation of numbers one to ten. Your program must take as input a number from the user in words (i.e. as "one", "three"…) and display the corresponding translation in Dzongkha (i.e. as "chi", "sum"…).