Python Programming for Engineers

Assignment # 3

Due date: Wednesday, Dec. 1st, 2021

IMPORTANT!

1. Submit your HWs **ONLINE** before the due date
2. HW reports should contain:
    a. The description of the problem and proposed solution
    b. The program code
    c. Any program outputs
3. Submitted codes should be well-commented.

Problem 1:

Write a program that finds the common substrings between two strings *X* and *Y.* Your program should be case-insensitive (i.e., letter '*a'* and letter '*A'* are equivalent), and multiple occurences of a substring should be counted only once. For example, the strings "araba" and "BABA" have 5 common substrings: ('a', 'b', 'ab', 'ba', 'aba').

Your program should print all the common substrings and their total count.

Problem 2:

Implement and test the **bucket sort** algorithm for different values of *n* and *k*, where the input is a random list of integers of length *n*, and integer values are in the range [0, *k*-1]. Compute and plot the execution times vs. (*n*+*k*) and show that the average complexity of bucket sort is *O(n+k)*.

Problem 3:

Write a Python function, named "*find_pattern*", which accepts a list as input. The function will find and return **a list of successive numbers that are increasing/ decreasing by a fixed amount** in the input list (there has to be at least 3 successive numbers in the pattern).

Example : Input list : [2, 8, 4, 6, **3, 2**, **1**, **0,** 8, 4, 7, 9, **5, 7, 9**]
Returned list: [[3,2,1,0], [5,7,9]]