TK3043 Tutorial 3

Attempt the questions below. As usual, answer must be hand-written, and upload the pdf/image in the UKMfolio by 8th April 2024.

1. Show the sorting process in sorting the list FLOWER in alphabetical order by selection sort. Is selection sort stable?

2. Sort the list MINORITY in alphabetical order by bubble sort.

    a) Prove that if bubble sort makes no exchanges on its pass through a list; the list is sorted and the algorithm can be stopped.
    b) Write pseudocode of the method that incorporates this improvement.
    c) Prove that the worst-case efficiency of the improved version is quadratic.
    d) Is bubble sort stable?

3. Determine **the number of character comparisons** made by the brute-force algorithm in searching for the pattern AIR in the text "IDA in the text DIRENDAM_TIDAK_BASAH. Assume that the length of the text—it is 20 characters long—is known before the search starts.

4. For TSP problem, assume that each tour can be generated in constant time;

    a. what will be the efficiency class of the exhaustive-search algorithm outlined in the lecture notes for the traveling salesman problem?
    b. If this algorithm is programmed on a computer that makes one billion additions per second, estimate the maximum number of cities for which the problem can be solved in
        i. four hours;
        ii. half a day;
        iii. four years;

5. Given an 8 liter jug full of water and two empty jug of 5 and 3 liter capacity, get exactly 4 liter of water in one jug by completely filling up and /or emptying jugs into others. Solve this by using depth-first search.