CS2023 - Data Structures and Algorithms
In-class Lab Exercise

Week 3
March 16, 2023

You are required to answer the below questions and submit a PDF to the submission link provided under this week lab section before end of the session time (no extensions will be provided). You can either write / type your answers, but either way your answers should be readable.

Question 1

- Create five random arrays with the length in range of [500 to 20000] and implement the following sorting algorithms.
    1. Insertion sort
    2. Bubble sort
    3. Optimised bubble sort
    4. Selection sort

- Calculate the time taken in seconds for the above sorting algorithms and plot against each different array length.

- Comment and compare on the time complexity for each sorting algorithm.

- Upload the answers as a PDF file named, "**In<no>_IndexNO.pdf**"

Sample expected output:

Insertion Sort:
total elements in array: 3
time taken is 0.120000

total elements in array: 5
time taken is 0.480000

total elements in array: 7
time taken is 1.080000

total elements in array: 15
time taken is 1.900000

total elements in array: 20
time taken is 2.960000

Bubble sort:

_ _ _ _ _ _ _ _ _ _
_ _ _ _ _ _ _ _ _ _

_ _ _ _ _ _ _ _ _ _
_ _ _ _ _ _ _ _ _ _

Optimised bubble sort:

_ _ _ _ _ _ _ _ _ _
_ _ _ _ _ _ _ _ _ _

_ _ _ _ _ _ _ _ _ _
_ _ _ _ _ _ _ _ _ _

Selection sort:

_ _ _ _ _ _ _ _ _ _
_ _ _ _ _ _ _ _ _ _

_ _ _ _ _ _ _ _ _ _
_ _ _ _ _ _ _ _ _ _

Sample expected plot:

The values used to plot the below sample expected output will not be the exact match to your answers.