**Programming Assignment 2**

**Due: 9/26/2022**

The objective of this assignment is to explore sorting algorithms and benchmark for the running times.

Link to the video description of the assignment:

[https://csulb.zoom.us/rec/share/r2MBszcPmpAHrxK9e\_-VTZCXsueB0x47Q8NK5XArZTbewYuGsm5iFgI0s-hDx2xl.TKTvbsYFZAcu3w-p](https://csulb.zoom.us/rec/share/r2MBszcPmpAHrxK9e_-VTZCXsueB0x47Q8NK5XArZTbewYuGsm5iFgI0s-hDx2xl.TKTvbsYFZAcu3w-p%20)

Passcode: 8qB!&HQ6

**Assignment**

1. Implement three programs for three sorting algorithms: InsertionSort , QuickSort and, MergeSort.
2. Each of these algorithms accept an array of integer as input and return an array of arrays.

The first element of your output is a descending sorted array of input and the second element of output is the running time of the algorithm in seconds.

For example:

Input = [2,3,4,1]

Output = [[4,3,2,1], 2]

1. Programs use four inputs:
   1. A descending sorted array with 1000 elements
   2. An ascending sorted array with 1000 elements
   3. A randomly generated array with 1000
   4. A randomly generated array with 100000
2. Run your algorithms for each of four inputs, measure the running time of algorithms.
3. Report the result using a table or chart.

Note: An example of the code is given to you for bubble sort please run it and do your codes the same way

**What to submit?**

1. Write 3 programs for each algorithm. Please name your programs as follows:
   1. insertionsort\_yourname.py
   2. quicksort\_yourname.py
   3. mergesort\_yourname.py
2. Your programs should be run as follows:

Insertionsort\_youname.py inputtype, elements\_count ,seed

Inputtype: is either a,b,c . Letters refer to the type of your input array described in the previous section.

* Elements\_count: The number of elements in input array
* seed: is used only for the random base inputs that guarantees I get the same result of random array so I can grade your code based on it.

Example1: python insertionsort\_yourname.py c, 1000, 2

Note that, c and d use the same function with different elements count

Example2: python quicksort\_yourname.py a, 1000, 2

Note: You can always keep the seed equal to 2

1. Please have your name top of your all programs.
2. You should follow general software development rules such as proper and sufficient commenting if it is necessary and proper functions and variable names.
3. For timing of your code please fill the excel sheet given to you.
4. Do not copy any code from online resources!