CSE 5311 Homework Assignment 1 (Fall 2023)

Due date: 11:59pm 9/5 (Tuesday) (upload one pdf file in Canvas)

(1) **[30 points]** Implement the **insertion sort** and **merge sort** algorithms with any programming language you choose and run them with the same input number list. Generate the list elements with a random function and increase the list size incrementally until you find the execution time of your merge sort program is consistently shorter. Plot the two curves in a figure (execution time vs input list size) about the two programs. Using the example to discuss why the asymptotic analysis is meaningful. Enclose your program codes in your submission. To find our meaningful performance trend, you need to use very long lists, such as those with millions of numbers, to make the execution time sufficiently long (e.g., a few seconds).

(2) **[30 points]** Problem 2-1 on Page 39 of the CLRS textbook. (***"2-1 Insertion sort on small arrays in merge sort")***

(3) **[10 points]** Exercise 2.2-1 on Page 29.
(4) **[10 points]** Exercise 3.1-1 on Page 52.
(5) **[10 points]** Exercise 3.1-2 on Page 52.
(6) **[10 points]** Problem 3.4 (b) (h) on Page 62.