

CS-1203 - Spring 2023 - Assignment 3

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Question 2

Comparing the time complexities insertion sort and bubble sort:

Insertion Sort:

Theoretical time complexity:

Best-case: $O(n)$ in the case of the sorted array

Worst Case: $O(n^2)$

Bubble Sort:

Theoretical time complexity:

Best-case: $O(n)$ in the case of the sorted array

Worst Case: $O(n^2)$

Note: On average bubble sort requires more comparisons than insertion as seen in the experimental data

Question 3

Comparing Heapsort (as a combination of HeapInsert and HeapDelete), MergeSort and QuickSort

Heap Sort:

Theoretical time complexity: $O(n \log n)$

Merge Sort:

Theoretical time complexity: $O(n \log n)$

Quick Sort:

Theoretical time complexity:

Average Case: $O(n \log n)$

Worst Case: $O(n^2)$

Note: From the experimental data Quicksort appears to have the least comparisons but the most swaps and merge sort and heapsort have more comparisons and lower swaps