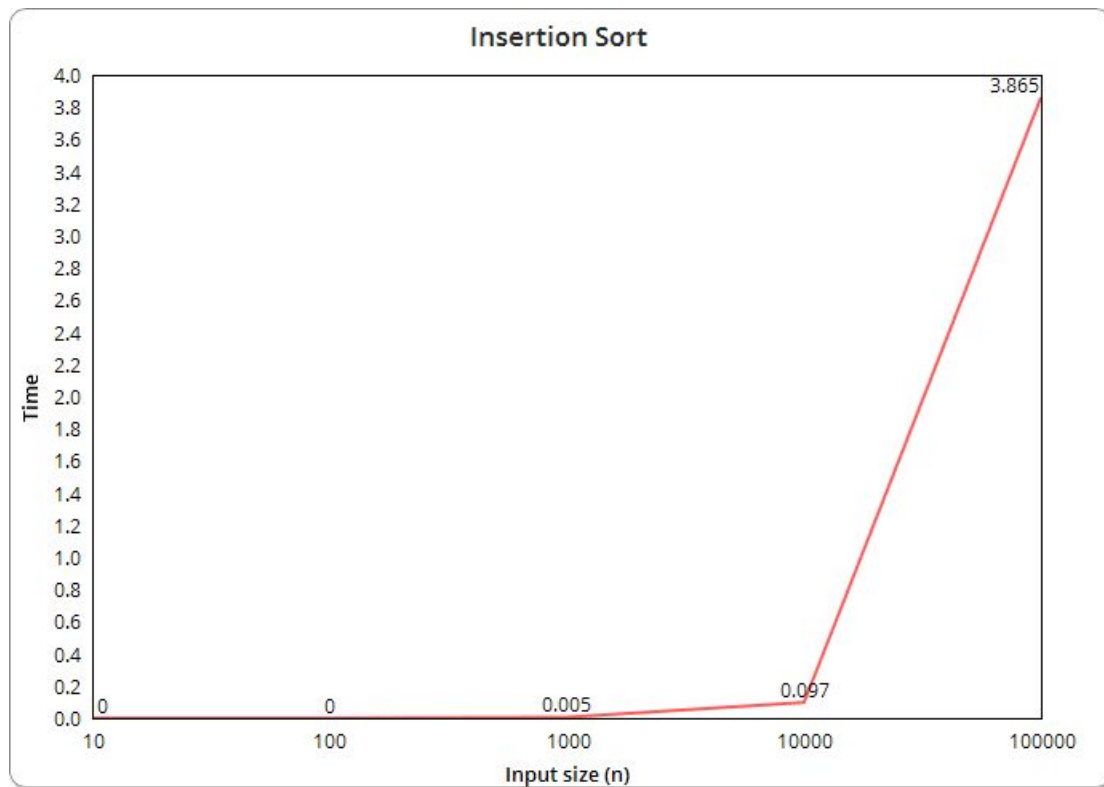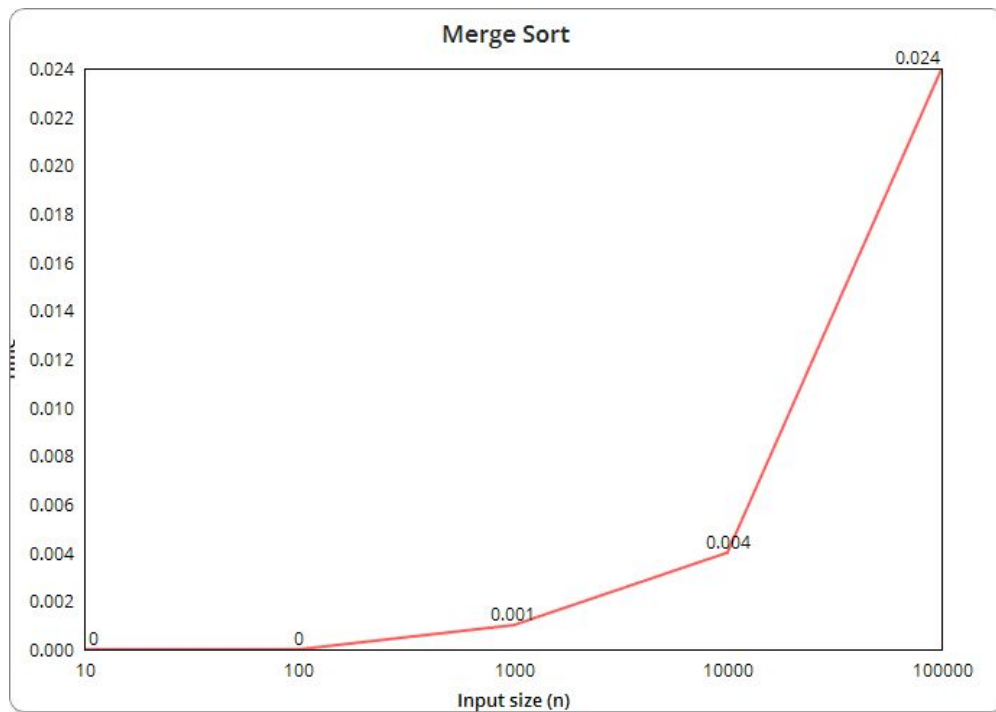# Algorithmic Analysis

Empirical Analysis of the Elementary Sorting Algorithms

Input Size (n)	Time elapsed - Insertion Sort	Time elapsed - Merge Sort	Time elapsed - Merge Sort Enhanced
10	0.0	0.0	0.0
100	0.0	0.0	0.0
1000	0.006	0.001	0.0
10000	0.041	0.004	0.0
100000	3.336	0.024	0.008

Insertion Sort - Timing Graph

Merge Sort - Timing Graph

Merge Sort Enhanced - Timing Graph

Comparison Graph

Comparative Graph

Time vs Input size (n)

Legend: ■ Enhanced Merge Sort ■ Merge Sort ■ Insertion Sort
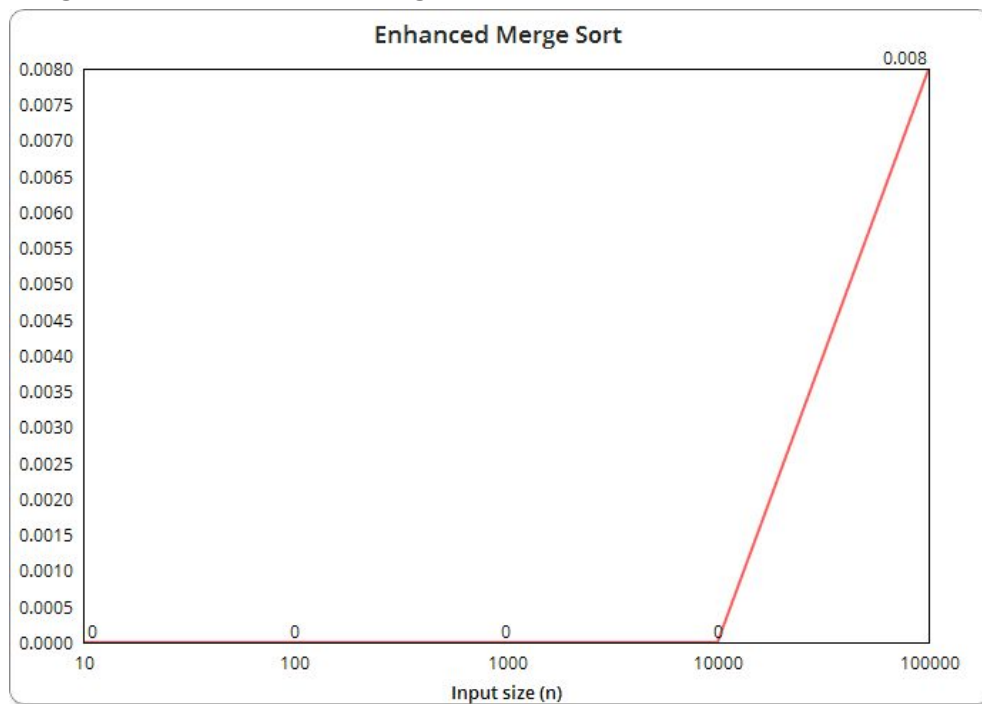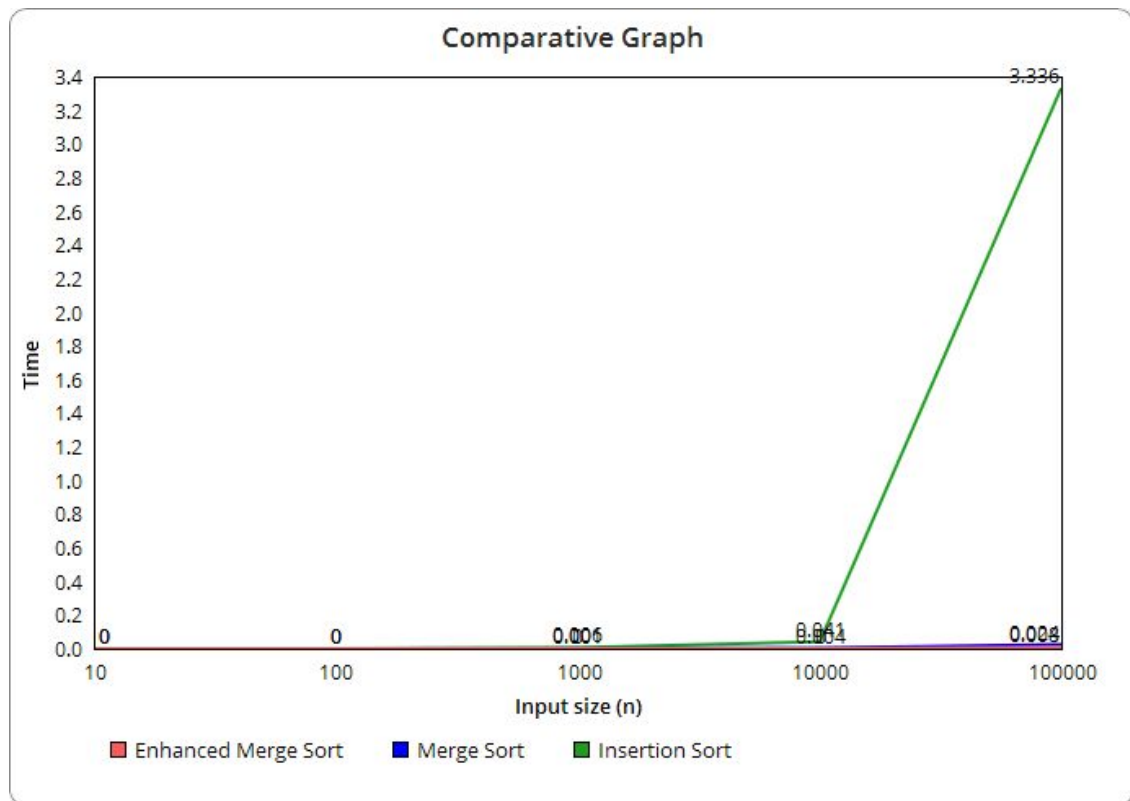
From the empirical results as well as the graphs above, we can see a significant improvement for larger input sizes using MergeSort.

In addition to that, there is an improvement in performance when using the enhanced merge sort, thus switching to insertion sort for small sub-arrays (10 elements) and ensuring that the array is not already sorted and therefore avoiding needless comparisons.