

2) (5 pts) DSN (Sorting)

In both Merge Sort and Quick Sort, in class we are taught to break down the sorting problem recursively such that the base case is a subarray of size 1 (or 0). It turns out that for both, on average, the implementation is *faster* if we have a base case with a subarray of size in between 20 and 50 and use a $O(n^2)$ sort (typically insertion sort) to sort the base case subarray. Even though insertion sort is $O(n^2)$, why does this modification to the algorithm result in a speed up for both Merge Sort and Quick Sort?