After all of the runs, I believe that Random Pivot QuickSort is the best overall sorting algorithm and MergeSort is the worst overall. I think this because Random Pivot QuickSort had the best average time for three total array sizes, array size of 2, 8, and 16 million, and MergeSort had the worst times in every test. Although Random Pivot QuickSort is not a stable sorting algorithm like Merge Sort, I think it is still better as its run time is far superior to that of MergeSort as seen in the tests.

As the array sizes increased, the results for the best setups did not stay consistent. For an array of size one million, Simple Pivot QuickSort, with a minimum recurse of 10, had the best time. For an array size of two, eight, and sixteen million, Random Pivot QuickSort, with a minimum recurse of 20, 10, and 10 respectively, offered the best setup. For an array of size four million, Median of Three QuickSort, with a minimum recurse of 5, had the best setup. Finally, for an array of size 16 million, random pivot with a minimum recurse of five offered the best time.

As array size increased, the results for the worst setups remained the same. Merge Sort was the slowest in every run. The minimum recurse for the worst setup varied from 5 to 40, with a mode of 20.

It seemed that the smaller base cases for recursion outperformed the larger base cases which surprised me. This can be seen as the best setups minimum recurse for each array size always fell between 5 and 20. I thought that a larger base case for recursion would be better because the benefit of divide and conquer (recursion) decreases as problem size get smaller

For an array of size N = 1000000, average run time should be O(1000000*lg(1000000)) = 6000000. However, The times I recorded were from 0.0448

to 0.110. My numbers are similar to those provided in the A4-1.txt file but I'm unsure as to how these empirical times compare to the asymptotic run times discussed in class.

Best Results (Array Size: 1000000, 5 runs)

Algorithm	Average Time (sec)	Min Recurse
Simple Pivot (Best Overall)	0.0448211	10
Random Pivot	0.04756813	10
Median of Three	0.0455287	20
Median of Five	0.045868854	10
MergeSort	0.1078142302	10

Best Results (Array Size: 1000000, 5 runs)

Algorithm	Average Time	Min Recurse
Simple Pivot	0.0845012	160
Random Pivot	0.088911401	160
Median of Three	0.08544073	160
Median of Five	0.0852987594	160
MergeSort (Worst Overall)	0.11041692519	5