Assignment 4 Writeup

Based on all of my results for all of my configurations, there is no algorithm that is better than another in all situations. However, when examining the algorithms under certain circumstances, some do show clear advantages and disadvantages. When the data is random, it is obvious that merge sort is the worst. All of my runs with random data showed this. For example, during the random 1280000-size run, the worst setup was merge sort. It had a minimum recurse of 3, and an average time of about 0.5178 seconds. The minimum recurse for merge sort was also 3 for the random 320000-size run. However, in all other runs, the minimum recurse ranged anywhere from 38 to 63. This is most likely due to processes my computer had running in the background while testing. If run again, these numbers would fluctuate and probably even trend towards the minimum recurse of 3 that the runs mentioned prior got. In terms of the best algorithm with random data, there is no clear winner. In my random 320000 and 640000 runs, I got simple pivot quicksort. For my random 1280000-size run, random pivot quick sort was the fastest. For the random 2560000 and 5120000 runs, I ended up with median of three being the best. When looking at the data, it seems that median of three performs well with larger arrays. However, this could change with more runs. For example, sometimes random pivot quick sort out-performed simple pivot in the 320000-size run.

For the sorted tests, it is obvious that merge sort is the best algorithm—every test showed this. For example, in the 20000-size run, it had an average time of 8.2738E-5 seconds, with a minimum recurse of 43. Again, the minimum recurse fluctuates with each test due to background activity on my computer. Undoubtedly, simple pivot quicksort is the worst algorithm when the data is sorted. In all 4 test sizes, it ended up being the slowest. In the 40000-size run, it had an average time of about 0.69913 seconds. The merge sort in the same run had a time of 1.5770385E-4 seconds. This difference illustrates how much faster the merge sort runs with sorted data than the simple pivot quicksort.