

CMPU-241  
Professor Meireles  
Homework 4

After putting my array creation in the correct place, my code ran as I expected, with the sorts going from quick sort as the fastest, to heap sort, to merge sort, and finally insertion sort as the slowest sorting algorithm. There was a portion at the beginning where insertion sort was the quickest, but once the input size started getting larger (above 128 elements), this quickly changed. This is probably due to the size not being large enough for the highest order factor to be the main part of the algorithm affect sorting time. Heap sort and merge sort also had more similar average run times than I had expected. I thought heap sort would be more centered between quick sort and merge sort than it was, but instead it is obviously closer in average run time to merge sort. Other than these two small things, all of my expectations on run time were met.

The graph shapes were also as I expected. I thought it was neat how heap sort, merge sort, and quick sort had almost identical graph shapes, which makes sense since they all have the same average run time of  $n \lg n$ , but were just stacked one above another. For this same reason, them all having the same average run time, this shaping trend met my expectations. I would have been surprised if it had been another case, as run time has the most impact on what the final graph shape ends up looking like. I was also not surprised that insertion sort had a sharper curve, considering it has an average run time of  $n^2$ . Therefore all of my expectations were met.