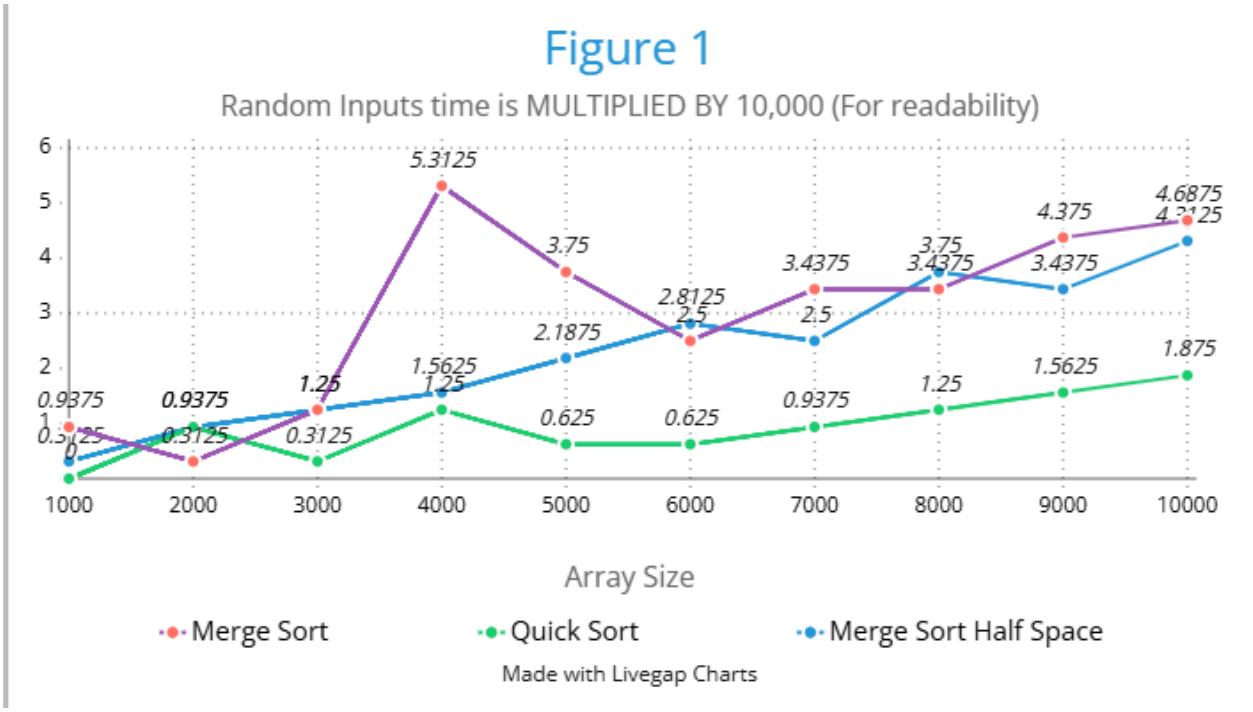
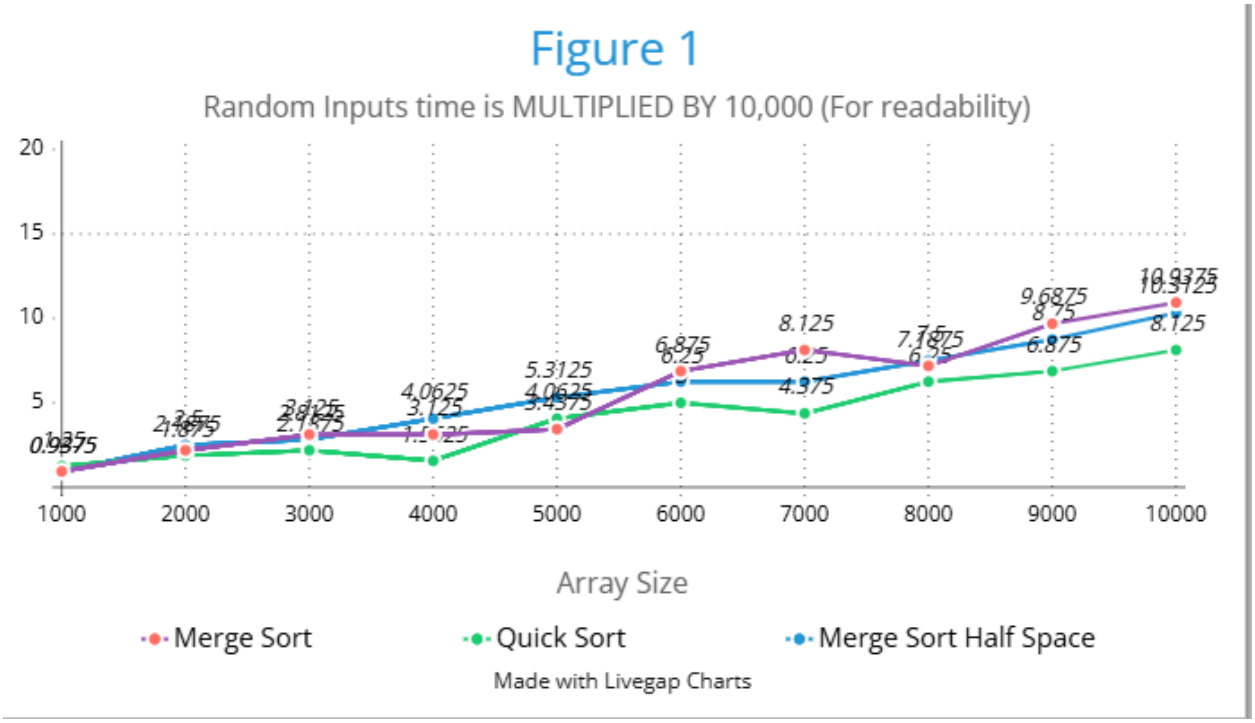
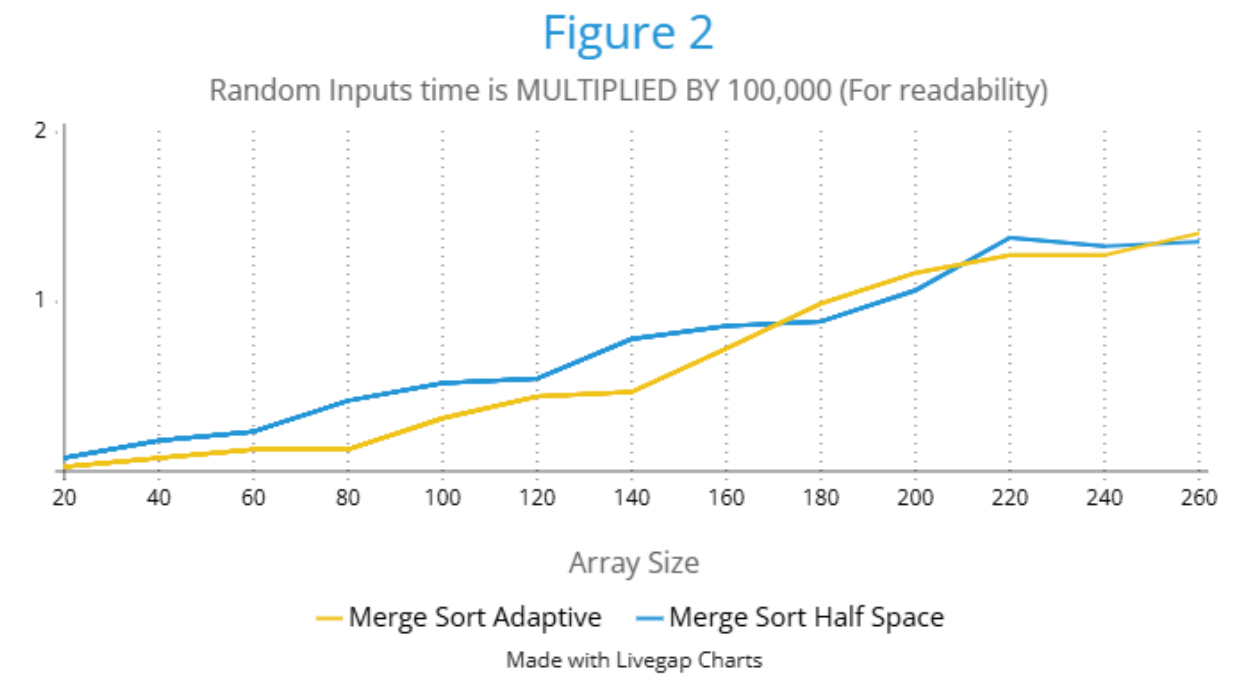
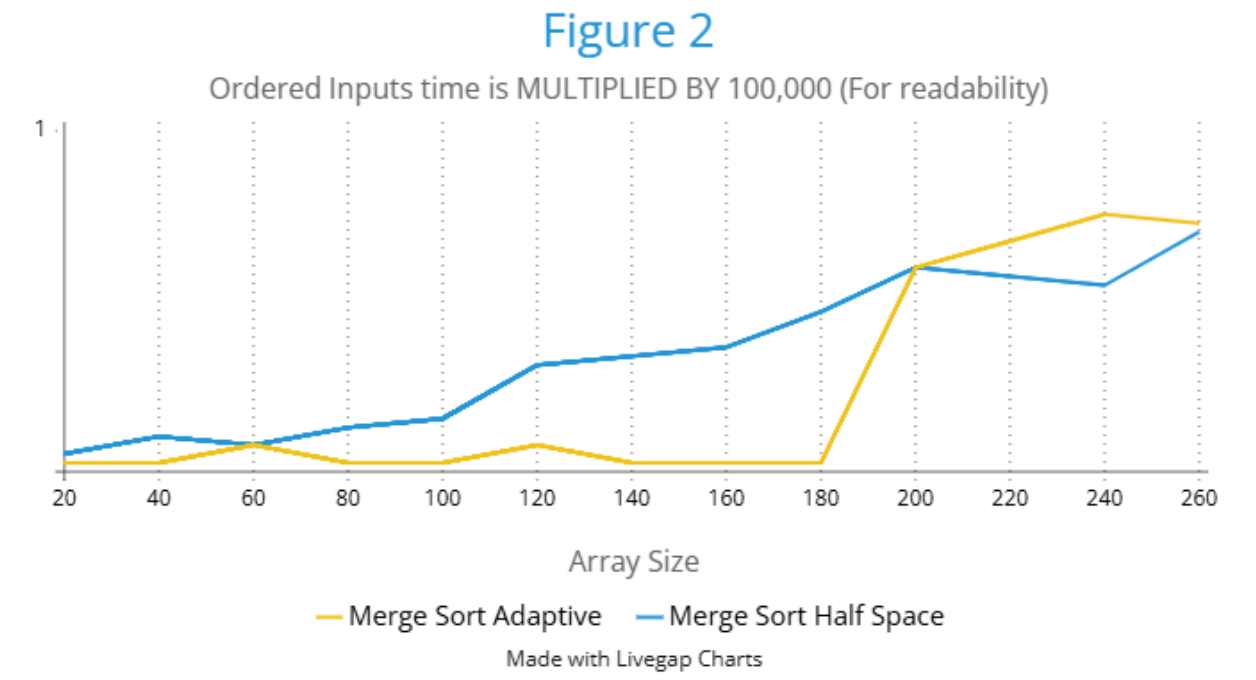




Merge sort improved seems to be a little bit faster than the normal merge sort in both random numbers and ordered numbers. The results show that the improved merge sort averages out to be a bit faster than the normal merge sort in both cases. But quick sort is definitely faster than the improved merge sort in most cases. The data shows that the merge sort improved is almost always slower in both ordered inputs and random inputs. Therefore out of the 3 sorts Quick Sort is the fastest in both cases.

Figure 2:



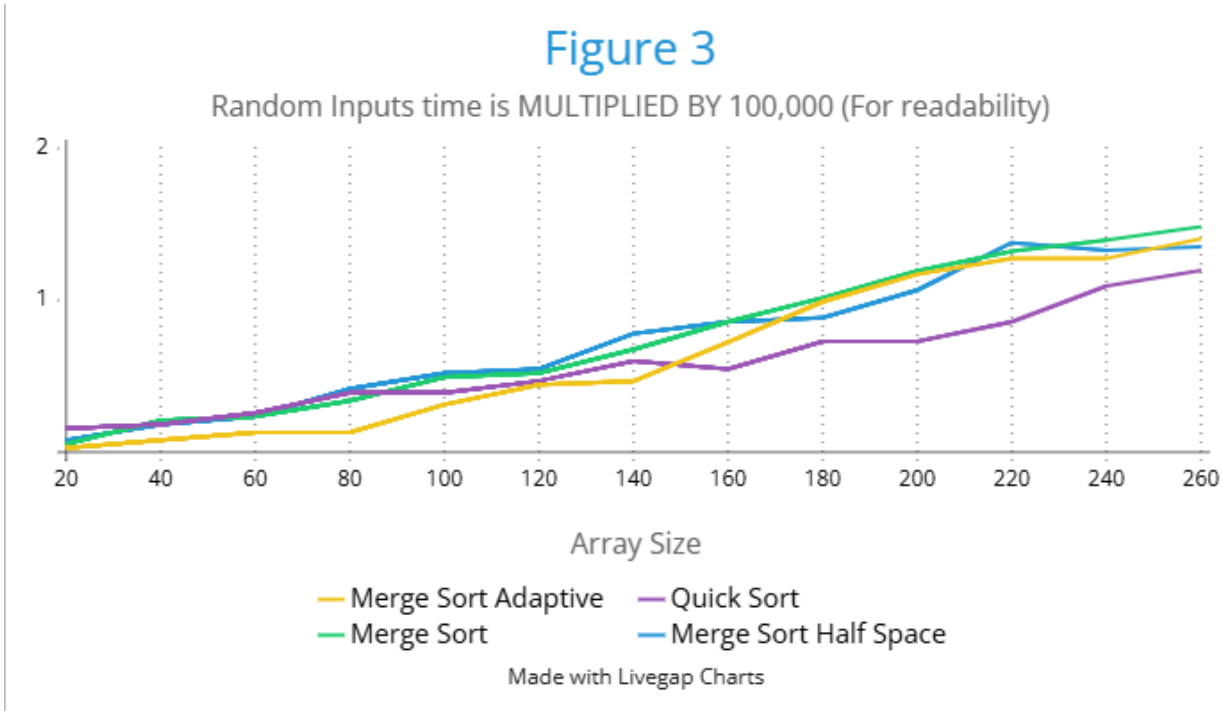


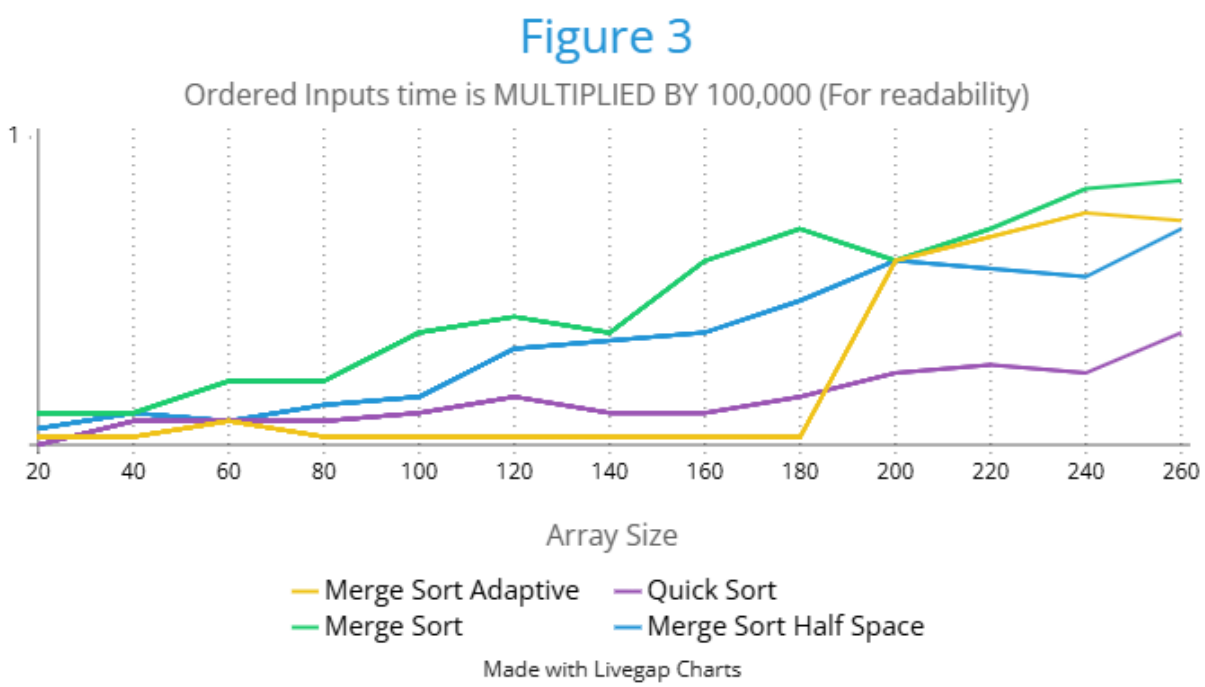
Random Ordered

Threshold - 190

For random inputs the Improved merge sort is clearly slower than Merge sort adaptive until the point around 160. But in an ordered input insertion sort is pretty much always faster so I decided that insertion sort gets way too slow around 200 so I chose 190 as my threshold. Otherwise insertion sort gets way too slow past 200 while merge sort is much faster past 200. Therefore Merge Sort adaptive is faster excluding a small difference of time when there are random inputs and a size of 100 - 190.

Figure 3:

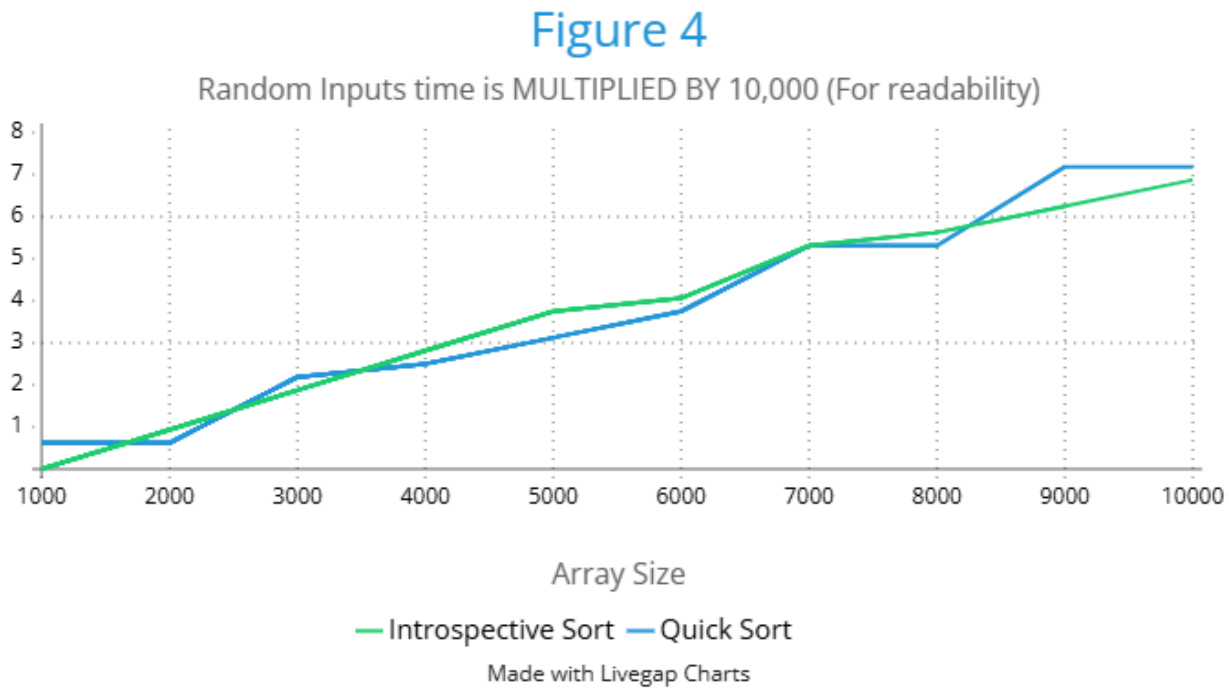




Ordered Random

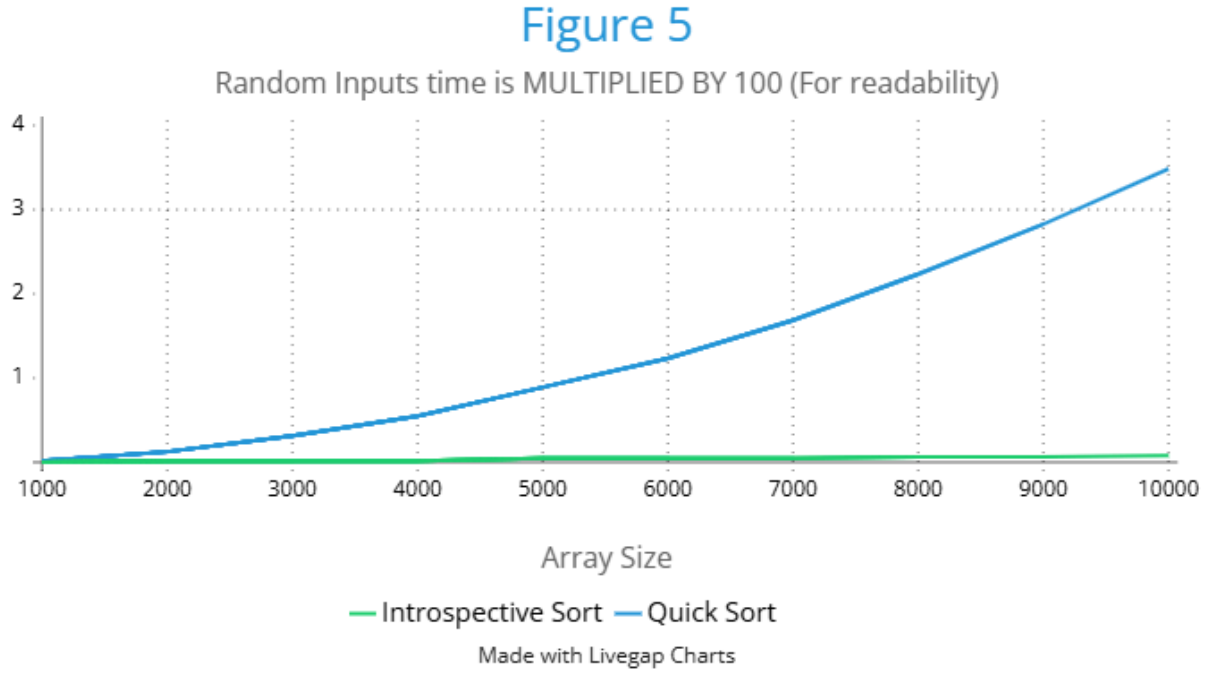
For ordered Input Merge Sort Adaptive is the fastest up until it hits the threshold (Half space Merge Sort takes over) then Quick sort turns into the fastest. While Merge sort is the slowest for random inputs. Merge sort adaptive is the fastest up until it hits 150 then quick sort is the fastest for random inputs. Therefore merge sort adaptive is the fastest until the size gets to around 150, then quick sort is the fastest from 150 to infinity. In both cases Merge sort is always the slowest.

Figure 4:



For random inputs, from array sizes 1000 to 10000 introspective sort seems to be slighter faster at sorting than quick sort. The times are extremely close only differencing by a super small amount, regardless of the array size.

Figure 5:



For the worst case, from array sizes 1000 to 10000 introspective sort is much faster at sorting. The time difference gets exponentially different as the size goes up. It first started off as a small

difference but as the array size increase the difference increased exponentially. By 10,000 it looks like introspective barely change compared to quick sort. This shows that introspective has a worst case of nlogn while quick sort still has a worst case of n^2.