COP 3502 Study Group Sheet: Sorting

Directions: Work together as a group to try to solve these problems. Talk through issues and see if you can convince yourselves of the right path to move forward. In groups with a TA/ULA, towards the end of the session some of the solutions will be covered. At the end of the week, the solutions will be posted for everyone.

1) Show the state of the following array after each iteration of Bubble Sort of the array shown in the first row of the chart.

Original	12	3	19	5	4	13	18	16	7
1st pass									
2nd pass									
3rd pass									
4th pass									
5th pass									
6th pass									
7th pass									
8th pass									

2) Show the state of the following array after each iteration of Selection Sort of the array shown in the first row of the chart.

Original	12	3	19	5	4	13	18	16	7
1st pass									
2nd pass									
3rd pass									
4th pass									
5th pass									
6th pass									
7th pass									
8th pass									

3) Show the state of the following array after each iteration of Insertion Sort of the array shown in the first row of the chart.

Original	12	3	19	5	4	13	18	16	7
1st pass									
2nd pass									
3rd pass									
4th pass									
5th pass									
6th pass									
7th pass									
8th pass									

4) Show the state of the following array after the 1st Merge completes, the 2nd Merge completes, the 3rd Merge completes, …, 7th Merge completes:

Original	12	3	19	5	4	13	18	16
1st Merge								
2nd Merge								
3rd Merge								
4th Merge								
5th Merge								
6th Merge								
7th Merge								

5) Consider running the in place Partition algorithm show in class on the following array, with the partition element initially stored in index 0. Show the state of the array right after the partition is complete:

Original	12	6	19	40	13	4	5	38	7
After Part									

6) Explain why Quick Sort can be "done in place", while Merge Sort can not.

7) Why is the worst case run time of Quick Sort $O(n^2)$, but the worst case run time of Merge Sort is O(nlgn)?

8) Why is Quick Sort faster in practice than Merge Sort, even though theoretically, in the worst case Merge Sort is faster?