1) Expand the recurrence $T(n)=7T(n/2)+n^3$ 1 step, that is so $T(n/2)$ does not appear in the expression.

2) Suppose that you modify the "big 5" selection algorithm so that your subsets are of size 3 instead of 5. Show your work in getting the correct recursive equation which would govern the running time of the algorithm.

3a) Show that selection sort may repeat a comparison between elements which has already been made.

3b) Show that insertion sort will never repeat a comparison between elements which has already been made.

4) Show that mergesort may make a comparison x vs y which has the following property.

For any possible n, there are n sorted orders consistent with previous comparisons, but only 1 of these orders is consistent with x less than y. Thus while mergesort never repeats a comparison, it may make comparisons which are in some sense "very bad." I note that heapsort is even worse, in the sense that heapsort can repeat a comparison which has already been made.