EXERCISE FOR CSE202 – WEEK 5

This exercise considers the case when many keys are actually duplicates (which is a common situation, for instance when sorting an array of people by their age).

Question 1. *Show that if, in the partitioning procedure, one of the* `A[i]>=p` *or* `A[j]<=p` *was replaced by a* `>` *or* `<` *test, then quicksort would have quadratic complexity for all arrays with just a constant number of distinct keys.*

Question 2. *Assuming that 3-way partitioning can be done in* $n-1$ *comparisons of keys, show that on an array where the keys can only take two distinct values, the number of comparisons of keys performed by quicksort becomes* linear *in* n*.*

Question 3. *How is that compatible with the* $n \log_2 n$ *lower bound for sorting?*