

CSC282 Fall 2005 Homework #3

1. Show that the number of permutations that can be formed by merging two sorted segments **A** and **B** of lengths k and m , where $k+m = n$, is $\binom{n}{k} = \binom{n}{m}$. Assume $k \leq m$ for definiteness and assume no duplicate keys. Hint: One approach is to write a recurrence based on the relationship of **A**[0] and **B**[0], and use the result from question 2 of homework 1. But there are lots of other ways to look at it.
2. How many key comparisons are done by Mergesort if the keys are already in order when the sort begins?
3. Optimal-comparison sorting:
 - A. Give an algorithm to sort four elements using only five key comparisons in the worst case.
 - *B. Give an algorithm to sort five elements that is optimal in the worst case. (Check out CLRS Chapter 9 if you want a hint.)
4. CLRS 6.4-3
5. CLRS 6.4-4
6. CLRS 7.4-2
7. CLRS 6.1-6
8. CLRS 7-6