Homework 3, due Tuesday, February 7

READING: Chapters 6-9, 10, 12.

1. Show that the second largest element can be found with \(n + \lceil\log n\rceil - 2\) comparisons in the worst case. (20 points)

2. Show how QUICKSORT can be made to run in \(O(n \log n)\) time in the worst case, assuming that all elements are distinct. (20 points)

3. Show that \(2n - 1\) comparisons are necessary in the worst case to merge two sorted lists containing \(n\) elements each. (20 points)

4. Describe a \(O(n)\) worst-case time algorithm that, given a set \(S\) of \(n\) distinct numbers and a positive integer \(k \leq n\), determines the \(k\) numbers in \(S\) that are closest to the median of \(S\) in the sorted order of \(S\) (for simplicity we assume that both \(n\) and \(k\) are odd, so there is one median). (20 points)

5. Exercise 12.2-5 on page 293. (20 points)