

CSE 5311.004 Fall 2005

Exercise Set Week 3

1. Design an algorithm to find the  $k$ -largest elements in an unsorted array. Show that your algorithm runs in  $O(n + k \log k)$  time.
2. The **majority** of a set of numbers is defined as a number that repeats at least  $n/2$  times in the set. Design a linear time algorithm to find the majority, if one exists.
3. Show exactly why if we grouped elements into groups of 3 each, the median finding algorithm that we discussed in class will not work in linear time. What would be the running time of the algorithm in this case?
4. Which is better in the median-finding algorithm, grouping into groups of 5, or into groups of 7? Explain your answer.
5. Let  $X$  and  $Y$  be two arrays of  $n$  numbers each, both already sorted. Give a  $O(\log n)$  algorithm to compute the median of  $XUY$ .