# CPS 130 Homework 8 Selection 

due Thu May 30th

Write and justify your answers in the space provided. ${ }^{1}$

1. (CLRS 9.3-3) Show how quicksort can be made to run in $O(n \log n)$ time in the worst case.
2. (CLRS 9.3-5) Suppose that you have a "black-box" worst-case linear-time median subroutine. Give a simple, linear-time algorithm that solves the selection problem for an arbitrary order statistic.

[^0]3. Let $A$ be a list of $n$ (not necessarily distinct) integers. Describe an $O(n)$-algorithm to test whether any item occurs more than $\lceil n / 2\rceil$ times in $A$.
4. (CLRS 9.3-7) Describe an $O(n)$ 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 $S$.


[^0]:    ${ }^{1}$ Collaboration is allowed, even encouraged, provided that the names of the collaborators are listed along with the solutions. Students must write up the solutions on their own.

