

Algorithms: Assignment 7

Due date: October 9 (Wednesday)

Problem 1 (5 points)

Consider the problem of finding the k th smallest element of an array $A[1..n]$, that is, the element that would occupy the k th position after sorting the array. For example, if the array is $\langle 6, 4, 8, 2, 10, 0 \rangle$ and $k = 3$, then the k th smallest element is 4, since it is the third element in the sorted array $\langle 0, 2, 4, 6, 8, 10 \rangle$. Write an algorithm for finding the k th smallest element of a given array. Its average-case complexity should be *better* than the complexity of sorting. Thus, sorting the array and then returning the k th element is not an appropriate solution.

Problem 2 (5 points)

Suppose that $A[1..n]$ is an array of integer numbers, and some value k occurs at least $\lfloor n/2 \rfloor + 1$ times in this array. Write an efficient algorithm for finding this value and give the running time of your algorithm.