CS 180: Homework 4

Due 5/15 at 11:59 PM

For all problems requiring an algorithm, please also provide a corresponding proof and time complexity analysis.

Problem 1

Exercise 13 on page 194.

Problem 2

Exercise 17 on page 197.

Problem 3

Exercise 3 on Page 246.

Problem 4

Exercise 5 on page 248.

Problem 5

Suppose you are given an array of sorted and distinct integers that has been circularly shifted k positions to the left. For example, take $[1, 3, 4, 5, 7]$ and circularly shift it 2 positions to the left, you get $[4, 5, 7, 1, 3]$. Design an efficient algorithm for finding k.

Problem 6

Given two sorted arrays of size m and n respectively, you are tasked with finding the element that would be at the k-th position of the final sorted array. Note that a linear time algorithm is trivial (and therefore we are not interested in it).

Example:

Input: $Array1 = [2, 3, 6, 7, 9]$, $Array2 = [1, 4, 8, 10]$, $k = 5$
Output: 6