

In-class problems on Array Data Structure

Problem 1

Given an array of n integers in which each element is between 1 and $n-1$, write an efficient function to determine any duplicated integer. You may destroy the array. What are the time and space complexities of your solution?

Function Prototype in C/C++: `int findDuplicate(int a[], int n)`

Function Prototype in Java: `int findDuplicate(int a[])`

Problem 2

Given two arrays of m and n integers respectively, find an efficient approach to determine the number of common elements between them. Assume that the arrays does contain distinct elements respectively. What are the time and space complexities of your solution?

Function Prototype in C/C++: `int findCommon(int a[], int b[], int m, int n)`

Function Prototype in Java: `int findCommon(int a[])`

Problem 3

Given a 2-D array of distinct integers of size $n \times n$ in which every row and column are in ascending order and an integer element x , find an efficient approach to determine whether given array contains x or not? If element exists then return position of the element otherwise return $(-1, -1)$. What are the time and space complexities of your solution?

Function Prototype in C/C++: `Position findPosition(int a[][], int n)`

Function Prototype in Java: `Position findPosition(int[][] a)`