

Sample Problems: Group A

Here is a collection of practice interview questions to work through. For each of these problems, try to find the most efficient solutions you can. Some solutions might be incomparable to one another (for example, an $O(n \log n)$ -time, $O(1)$ -space algorithm versus an $O(n)$ -time, $O(n)$ -space algorithm), so if you find incomparable solutions, try thinking about the tradeoffs.

1. You have an array of n integers. Find the largest range $[a, b]$ where every integer in the range appears at least once in the array. For example, given the array 4, 1, 9, 0, 11, 3, 10, 2, the answer would be $[0, 4]$, since all of the values 0, 1, 2, 3, 4 appear at least once in the array.
2. You are given an array that is the rotation of a sorted array (that is, it was formed by taking a sorted array and moving some number of elements from the end of the array to the front). For example, the array $[3, 4, 6, 9, 0, 1]$ is a rotated array. Given some value k , determine whether k is contained in the array.
3. You are given an array of n numbers. Given a number k , determine whether the array contains two numbers whose sum is exactly k .
4. You are given a list of n closed intervals of real numbers. Find the smallest nonnegative integer that does not belong to any of those intervals.
5. The Fibonacci sequence is the sequence that starts with 0, 1 and where each successive term is the sum of the two previous terms. The Fibonacci numbers start off 0, 1, 1, 2, 3, 5, 8, 13, 21, You are given a list of n positive integers. Determine, for each number in the list, whether it's a Fibonacci number. When analyzing your algorithm, you should come up with a runtime in terms of n , the number of integers given, and U , the largest number given in the array.