

Design and Analysis of Algorithms

Question #1:

You are given a set A of n different numbers. The numbers in A are bitonic, i.e., the numbers are in increasing order till a maximum value (not known) and then in decreasing order.

- How fast can you search for any particular number $x \in A$?
- How fast can you sort A ?

Question #2:

Show the red-black trees that result after successively inserting the keys 41, 38, 31, 12, 19, 8 into an initially empty red-black tree. Show also the red-black trees that result from the successive deletion of the keys in the order 8, 12, 19, 31, 38, 41.

Question #3:

The input consists of a undirected graph $G = (V, E)$, encoded in the usual adjacency list representation. Design and analyze an $O(|V|)$ -time algorithm to decide whether or not G contains a cycle.