

Assignment 8

R-3.8 Is the multi way search tree of Figure 3.17a a (2,4) tree? Justify your answer.

R-3.10 A certain Professor Amongus claims that a (2,4) tree storing a set of items will always have the same structure, regardless of the order in which the items are inserted. Show that Professor Amongus is wrong.

C-4.11 Suppose we are given an n -element sequence S such that each element in S represents a different vote in an election, where each vote is given as an integer representing the ID of the chosen candidate. Suppose we know who the candidates are and the number of candidates running is $k < n$. Describe an $O(n \log k)$ -time algorithm for determining who wins the election.

C-4.22 Let A and B be two sequences of n integers each. Given an integer x , describe an $O(n \log n)$ -time algorithm for determining if there is an integer a in A and an integer b in B such that $x = a + b$.

8. A. Suppose the only available sorting algorithm in the library for an array-based Sequence is $\text{QuickSort}(S, C)$; this would be similar to the Java class library for sorting an ArrayList . However, Quick Sort is not a stable sort but you need a sort that is stable. You are to write a pseudo code function **StableSort(S)** for a Sequence S of Objects (containing duplicates) using QuickSort and the built-in comparator \leq .

Hint: Change the key (add an element to the key, i.e., make it a pair) and create a new comparator which would include \leq .