

2007 Paper 1 Question 12

Algorithms

- (a) How do insertions and deletions in a 2-3-4 tree retain the structure's perfect balance? [2 marks]
- (b) Explain the structural relationship between 2-3-4 trees and red-black trees. [4 marks]
- (c) Draw diagrams to illustrate left and right rotations at the root node of a binary search tree. Label the positions of all subtrees before and after the rotation. [4 marks]
- (d) Write pseudocode for a recursive function `move_to_root(x,k)` which, given a binary search tree with root node x and a key value k , uses a sequence of rotations to move the node with key value k to the root of the tree and returns a pointer to the new root node. [10 marks]