Fundamental Algorithms

Deadline: January 09, 2008

Problem 1

Prove that a binary tree can be reconstructed unambiguously using the numberings of a preorder and a postorder traversals of the tree. Can the same be done using preorder and inorder?

Problem 2

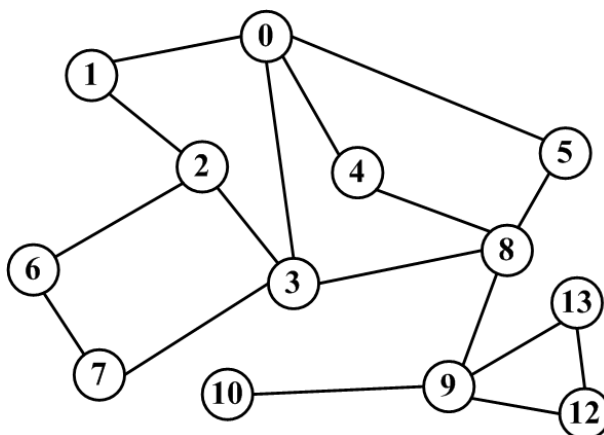For the given graph, starting with node 0, show how BFS and DFS traversals are done.

Abbildung 1: The Graph for DFS/BFS

Problem 3

Show that the tree defined by the edges traversed in a BFS (starting at v_0) is a shortest paths tree rooted at v_0.

Problem 4

Design an algorithm to find out the kth smallest number from a set of n unsorted (pair-wise different) numbers. What is the complexity of the algorithm?