Analysis of Algorithms: Assignment 9

Due date: April 16 (Wednesday)

Problem 1 (5 points)
The depth-first search algorithm may be used to identify the connected components of an *undirected* graph. Write a modified version of depth-first search for this task. It should determine the number k of connected components in an undirected graph and return this number. Furthermore, for every vertex u, it should assign an integer label $component[u]$, between 1 and k, that denotes the respective component. If two vertices are in the same component, they should get the same label; if not, their labels should be distinct.

Problem 2 (5 points)
This problem is from Exam 2; give a solution even if you solved it during the exam.

Give a *linear-time* algorithm that converts a sorted array $A[1..n]$ into a binary search tree. That is, the algorithm should input $A[1..n]$ and construct an n-node tree that includes all elements of the array. If your algorithm always produces a *balanced* tree, you may earn up to ten bonus points for this assignment.