Assignment 3

Available Since: May 15, 2014    Due Date: May 22, 2014, 12:00 a.m.
You are permitted and encouraged to work in groups of two.

Exercise 1: 4 Points

Let $T$ be a rooted tree with $n$ vertices and the property that any vertex is either a leaf or has at least two children.

(a) Give a tight lower bound for the number of leaves of $T$.

(b) Give a tight upper bound for the height of $T$.

Exercise 2: 6 Points

(a) Design and explain an efficient algorithm which determines the corresponding tree from given pre- and inorder sequences (the nodes are labeled uniquely). Show the corresponding asymptotic runtime.

(b) Determine the tree with your developed algorithm (a) from the following sequences and draw it.

preorder: A C B D E G H F I
inorder: B C E D A F H I G

Exercise 3: 4 Points

Show that a series-parallel graph is planar and acyclic.

Exercise 4: 6 Points

Given a series-parallel graph $G = (V, E)$ and its decomposition tree, design and explain an efficient algorithm to compute the visibility representation (given by the endpoints of the horizontal and vertical line segments) of $G$. Show the corresponding asymptotic runtime.