Assignment 1

Available Since: April 24, 2013  Due Date: May 2, 2013, 08:00 a.m.
You are permitted and encouraged to work in groups of two.

Exercise 1:  4 Points

A graph is chordal if it has no induced cycles of length greater than three. A graph is transitive orientable if its edges can be oriented such that if there is an edge oriented from $u$ to $v$ and an edge oriented from $v$ to $w$ then there is also an edge oriented from $u$ to $w$. The complement $\overline{G}$ of a graph $G$ is the graph in which two distinct vertices are adjacent if and only if they are not adjacent in $G$.

In the following let $G$ be a graph that has an interval representation.

(a) Prove that $G$ is chordal.
(b) Prove that $\overline{G}$ is transitive orientable.

Exercise 2:  3 Points

Show that the following statements are equivalent for an undirected graph $G = (V, E)$ with $n$ vertices and $m$ edges.

(a) $G$ is connected and does not contain any cycles.
(b) $G$ is connected and $m = n - 1$.
(c) There exists exactly one path between any two vertices of $G$. 
Exercise 3: 3 Points

(a) What is the longest term resulting from pre-, post- or inorder in the tree above?

(b) Show that the structure of a binary tree is uniquely determined by its pre- and inorder numbers.

(c) Is the structure of a binary tree also determined by its pre- and postorder numbers?