**HOMEWORK 6 – CS 211 Spring 2010**

**Due: June 1, 2010**

(40 pts)

**Name:**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Names of students you worked with on this assignment (if any): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Each student must turn in an assignment and do her/his own work. Turn in these pages with your answers written in the spaces provided. Please write clearly and large enough for me to read. Word processed homework assignments can receive 5 points extra credit, but only if all symbols, expressions and sentences are correctly represented.**

1. Draw a poset diagram for the set of all binary trees over the set {a, b} that contain either one or two nodes. Let mean that is either the left or right subtree of . (5 pts)
2. Let S be a set of trees. Let mean that has fewer leaves than. Show that this partial order on S is well-founded. (5 pts)
3. Use induction to prove that the function f computes the length of a list. . (5 pts)
4. Use induction to prove that the function f counts the number of leaves in the tree. (5 pts)

leaves(T) = if T = <> then 0

else if T= tree(<>, x, <>) then 1

else leaves(left(T)) + leaves(right(T)).

1. Use induction to prove . (5 pts)
2. Prove that isSubset works correctly. You may assume that isMember has already been proven to work correctly. (5 pts)

isSubset (K, L) = if K == <> then TRUE

else (isMember (head(K), L) and isSubset(tail(K),L))

1. Let N = { nodes in a binary tree }. Define  over  such that  if *n* is contained on the path from *m* to the root.
2. Is R a reflexive or irreflexive partial order? Explain. (4 pts)
3. Prove that R is a partial order (antisymmetric and transitive). (5 pts)
4. Give one upper bound and one lower bound of R. (1 pts)