MAT 3770 — Homework — Name: _____

Prove the following theorem is true *by induction on the number of full nodes* in the tree.

> ***Theorem.*** Given a binary tree T with n full nodes, the number of leaves in T will be $n + 1$.

Notes:

1. A *full node* in a binary tree is a node with two children.
2. A binary tree T is composed of a (possibly empty) left subtree, a (possibly empty) right subtree, and the root. In fact, any full node in T has both a left and a right subtree.
3. The sum of the number of leaves in T is the sum of the number of leaves in the left and right subtrees of the root of T.
4. If the root is a full node, the number of full nodes in T is the number of full nodes in the root's left subtree, plus the number of full nodes in the root's right subtree, plus 1 (the root itself).
5. Use strong induction.