Homework 3 Written
Jws2191

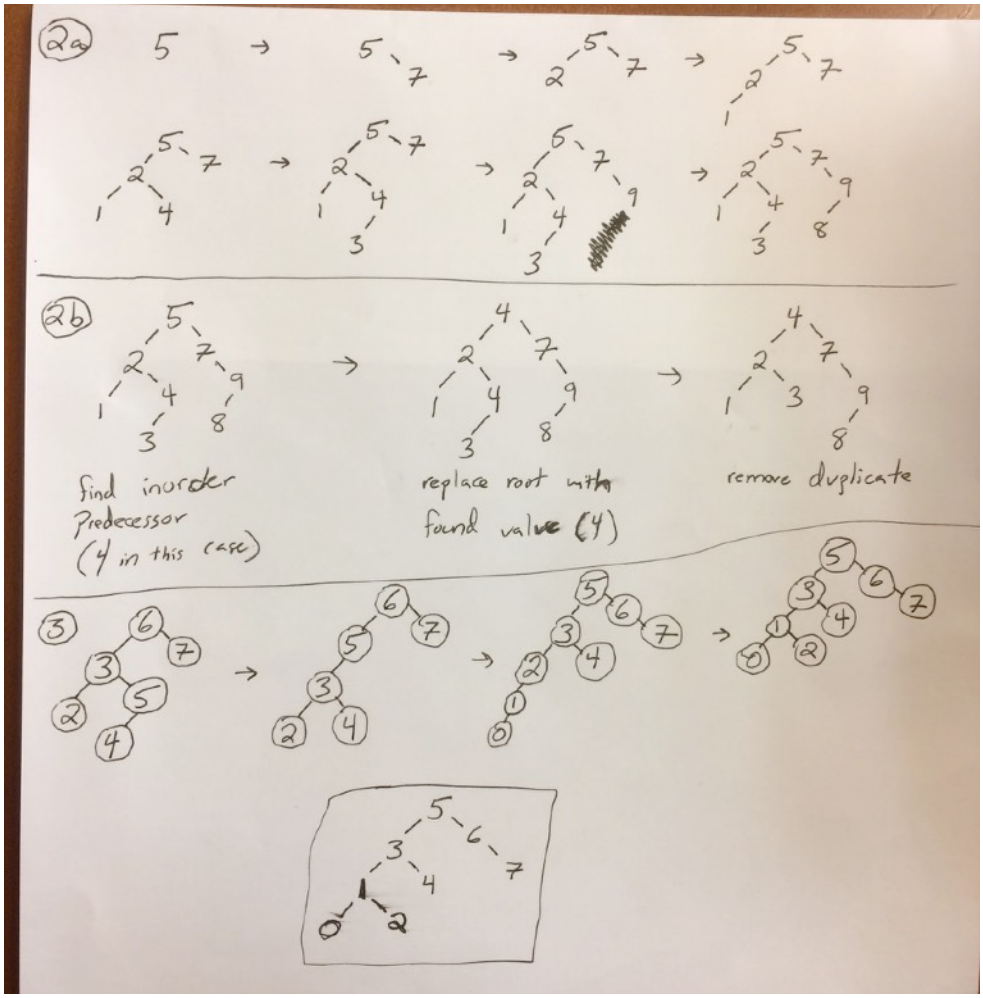
1.
Base Case: N = 2k-1
2 - 1 = 1

Assumption:
N = 2k-1
A tree with k leaves has N nodes.

Induction:
Prove k+1:
Plug in k+1 to N=2k-1:
N = 2(k+1)-1 = 2k+2-1= 2k+1

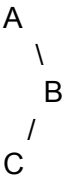
If you add two children to one leaf, then you are adding one leaf and creating a tree of k+1, because you are eliminating the leaf you add the nodes to, but adding two children, resulting in a net increase of one node. The total nodes then increases from N to N+2:

N + 2 = (2k-1)+2 = 2k+1
This is equivalent to our previous answer, Q.E.D.

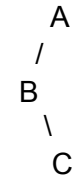


4.

Tree 1:




Tree 2:




The trees 1 and 2 both have the same preorder [A,B,C] and postorder [C,B,A] traversals, proving that only having those two traversals, and no inorder traversal is not enough to come to a unique tree.
(Tree 1: Root A, Right B, Right/Left C)
(Tree 2: Root A, Left B, Left/Right C)