CISC235
Winter 2007
Homework for week 5
in preparation for quiz 2
Solutions

1. An AVL tree is a binary search with the additional property that for every node v the heights of the subtrees rooted at the children of v, differ by at most one.

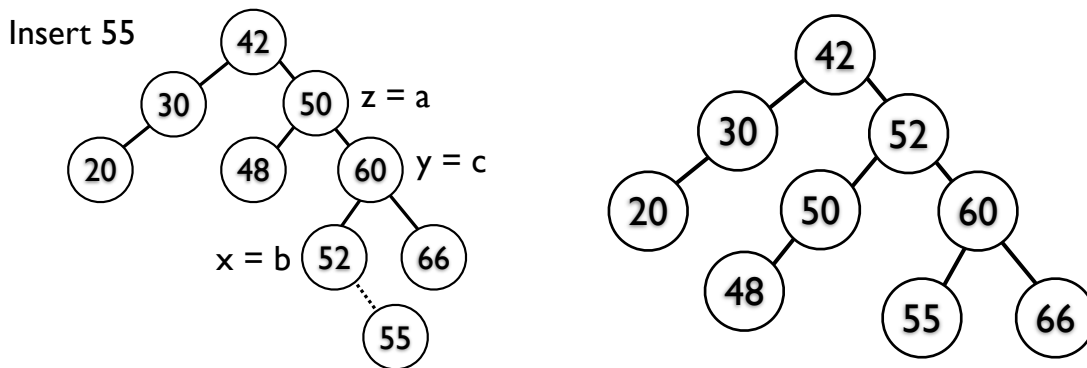2. The tree upon insertion of a node with key 55 is shown below.

Figure 1: The tree needs rebalancing and the key features of the restructuring algorithm are displayed on the tree. The final tree after restructuring is shown on the right.

3. The process of deleting the node with key 30 is illustrated in Figure 2.

4. In Figure 3 I have drawn an AVL tree of height 9 that requires four rounds of restructuring after the deletion of a single node. This structure can be generalized to obtain an AVL tree with n nodes so that $O(\log n)$ restructuring operations are required to rebalance an AVL tree after a single node deletion. restructuring
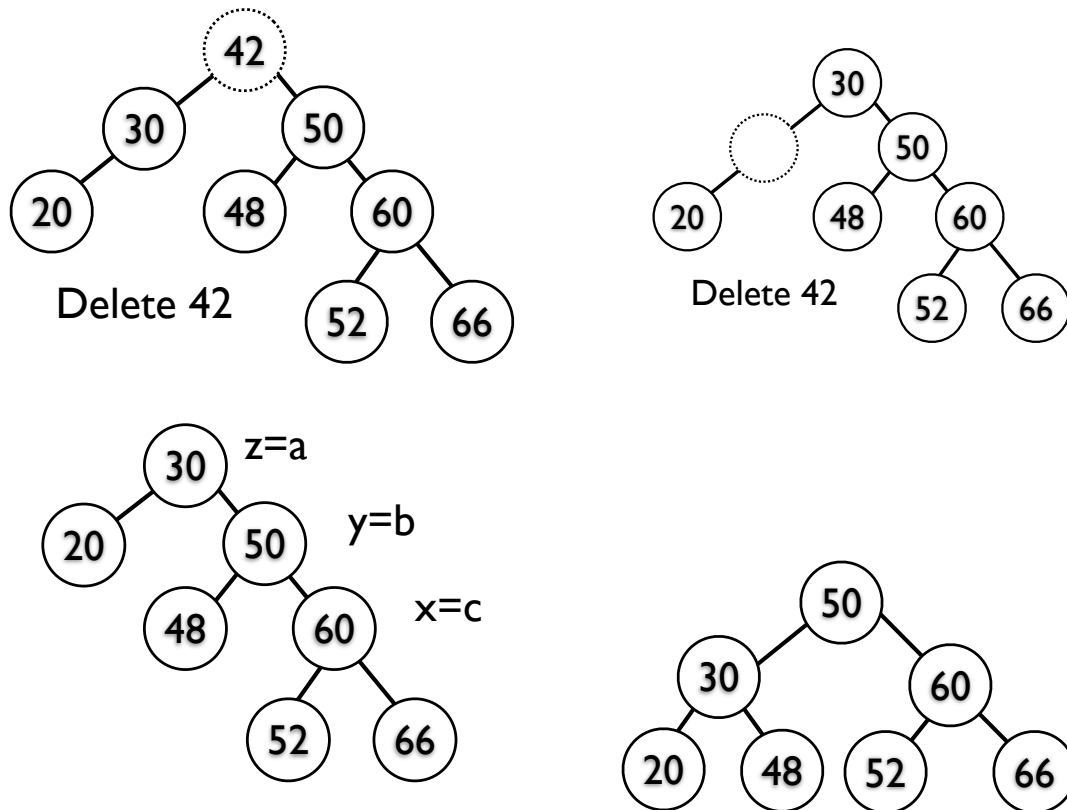
Figure 2: Find the predecessor node. Copy the contents.Delete the node. Rebalancing is required. The key features of the restructuring algorithm are shown.The final tree.
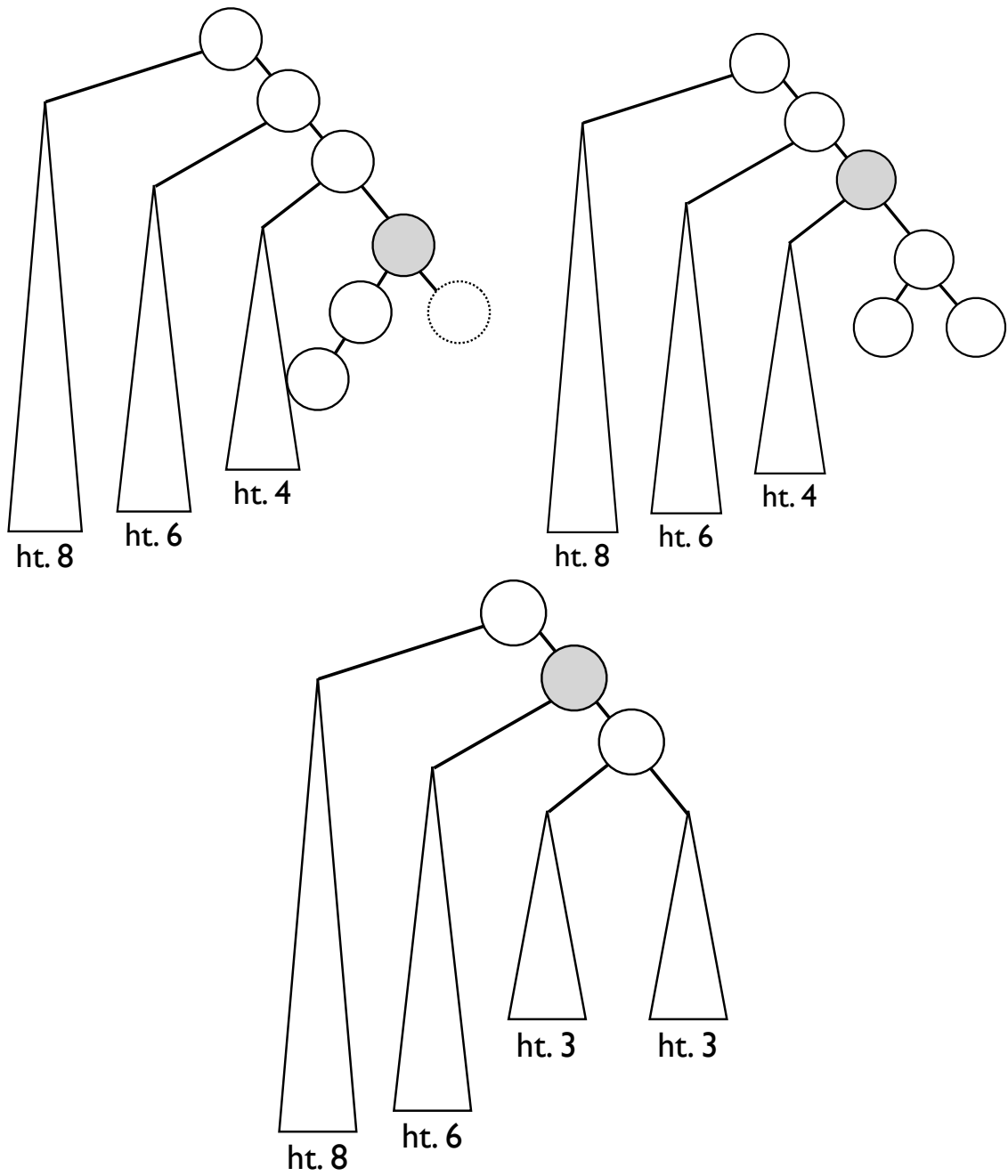
Figure 3: The dotted node is to be deleted. The shaded nodes trigger restructuring operations. Each of the triangles represents an AVL tree of the designated height.