Due: **Friday, Feb 13, 2009** at the beginning of class.

Please write your **NAME AND SECTION TA** on your homework.

**Problem 1. Practice with AVL Deletions**

In this problem, you will practice deletion on the following AVL tree:

For the questions below, you only need to show the final result, but note that if you do this it will be hard to award partial credit if the final result has problems.

(a) Perform the operation delete(20). When replacing the deleted node, find a replacement from the *left* subtree.

(b) Perform the operation delete(20). When replacing the deleted node, find a replacement from the *right* subtree.
Problem 2. AVL Deletion Cases

In class, we noted that there were two fundamental AVL deletion cases (left-left and left-right) and their mirror images. The following situation was resolved using a single rotation, thus treating it as a left-left case:

Would it have worked to treat it instead as a left-right case? Justify your answer.

Problem 3. Some Practice with Splay Trees

Weiss problem 4.27, 4.28. Again, you only need to show the final results, but showing intermediate steps will help in assigning partial credit.

Problem 4. Properties of Splay Trees

(a) Prove or disprove (“splay trees retain perfection”): Suppose that splay tree T is a perfect tree and we perform a find operation on any key in the tree. The resulting tree will also be a perfect tree.

(b) Given a splay tree S with N keys, specify a sequence of M find operations that is guaranteed (after all M finds are completed) to produce a list tree. You may assume the N keys contain no duplicates. Prove that your approach works for all splay trees.