Program 8: Balancing Trees

Submit Assignment

Due Sunday by 11:59pm **Points** 15 **Submitting** a file upload **File Types** h
Available after Oct 13 at 12am

Your job is to optimize the AVL algorithm in the file provided.

As written, it is O(2^n). That is Bad. First, whenever a change in the tree happens, it tries to balance every node in the tree. O(n). But we know that all potential balance issues are on the path we took so we don't need to check everything. O(log n)

Next, before and after balancing it updates the height of every node. Since a call to set the height recursively calls Set Height on both children, it's exponential. "For each node, tell every node to tell every node to tell every node to update."

So two big tasks here.

1. Track the path you take in PrivateFind. A stack would be perfect because you want to check them in the opposite order you put them in.
2. For each node on the path, update its height and check it for balance.
3. If you rebalance on an Add, you are done. A Remove has to do the whole path though.

And:

1. Update heights in an Add or Remove or Rotate, as you go along the stack part one is using
2. A good hint is wherever parents are changed the height might change

Basically, draw a picture. And use the great pictures in the textbook.