Insertions into an AVL tree

* each node in the tree maintains a balance field:
* -1 means "heavy on the left"
* 0 means "balanced"
* +1 means "heavy on the right"
* when a node is added, the balance fields need to be updated

What to do when a node is out of balance?

* Identify the pivot node

The pivot node is the node on the path closest to the newly-inserted node that is out of balance.

* Rotate. There are two kinds of rotations, single and double.

Single Rotation

* A single rotation is needed when the first two steps on the path from the pivot to the new node are in the same direction.
* In a single rotation, the root of the heavy child of the pivot rotates up to where the pivot was. The “orphan” subtree (the subtree that does not contain the new node) is attached to the pivot.

Double Rotation

* A double rotation is needed when the first two steps on the path from the pivot to the new node are in opposite directions.
* The first rotation occurs around the child of the pivot (orphan attached to child of pivot).
* The second rotation occurs around the pivot (orphan attached to the pivot).