Height Balance on BST
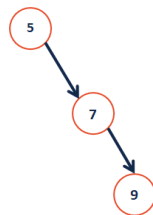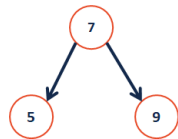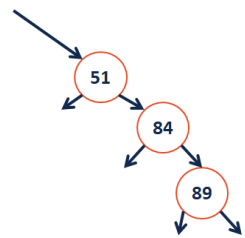
What tree makes you happier?
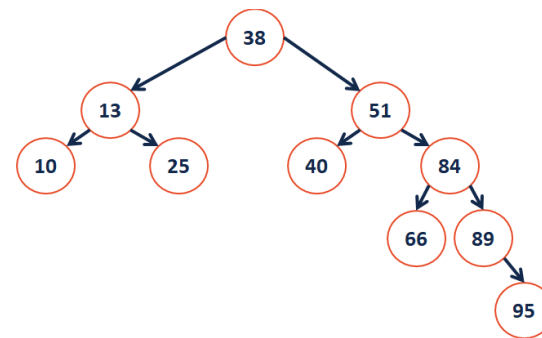
Let us describe the **balance (b)** of a BST to be:

- If **b** is negative:

- If **b** is positive:

We define a BST tree T to be **height balanced** if:

A node is considered to be **out of balance** it's not height balanced.

What is the lowest node that is out of balance?

Brining a tree back into balance

Goal: Create a strategy to bring a BST back into balance after an operation has caused the three to be out of balance.
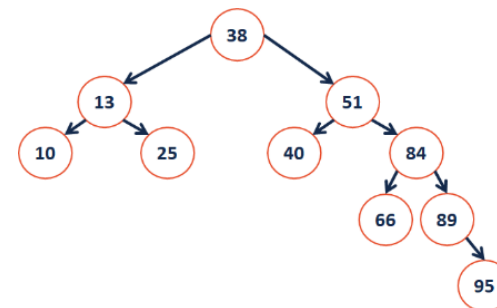
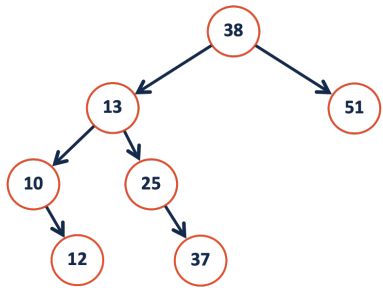A **Tree Rotation** is an operation that maintains two properties:

1.

2.

Example 1: Left Rotation

1. Where is the deepest point of imbalance in the tree: ➔

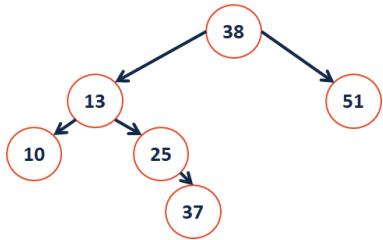2. Perform a rotation to balance this tree:

Example 2: Right Rotation

Example 3: A Complex Rotation

Rotation #1:

Rotation #2:

BST Rotation Summary:
1. Four kinds of rotations (L, R, LR, and RL)
2. All rotations are local
3. All rotations run in constant time, O(1)
4. BST property is maintained!

Overall Goal:

...and we call these trees: