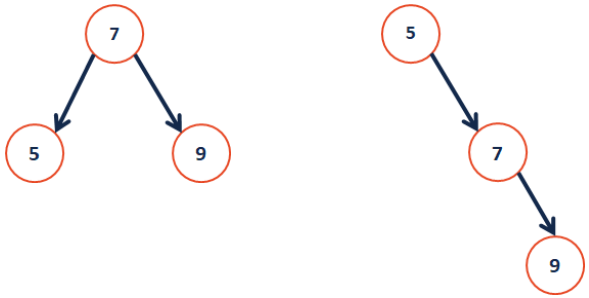
CS 225

#20: AVL Rotations

October 13, 2017

Height Balance on BST

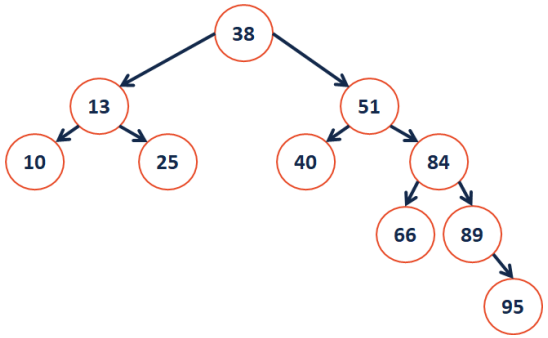
What tree makes you happier?



We define the **height balance** (b) of a BST to be:

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

What is the lowest node that is out of balance?



BST Rotations

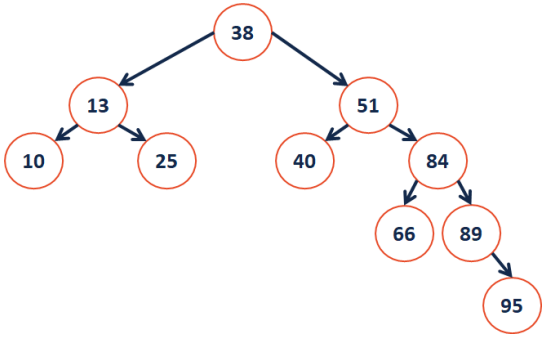
Every BST rotation will maintain two properties:

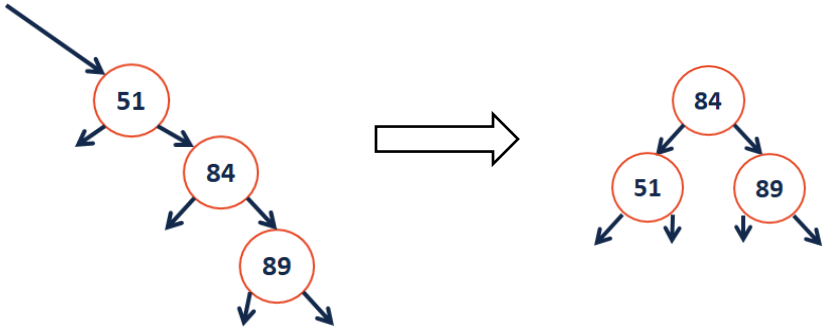
1.

2.

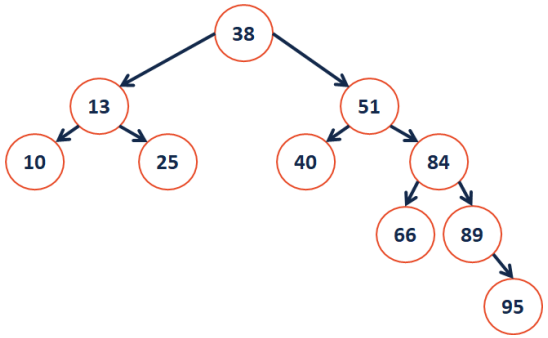
Example: Defining a Rotation

Given a _____ rotation about 51, we can label 4 subtrees:

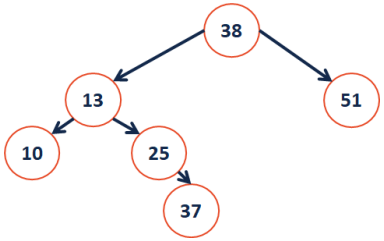


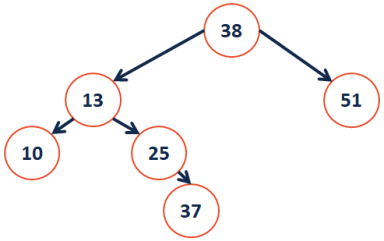


Implementing a left rotation:



Performing a right rotation:





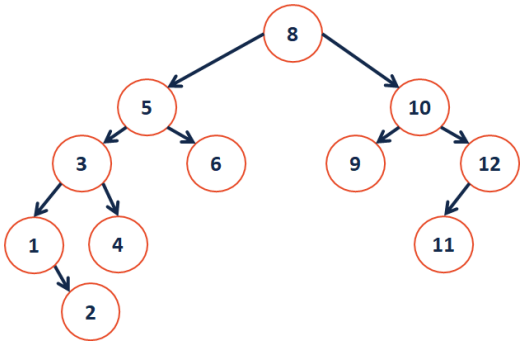
BST Rotation Summary:

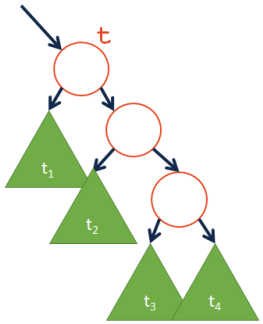
1. Four kinds of rotations (L, R, LR, and RL)
2. All rotations are local
3. All rotations run in constant time, O(1)
4. BST property is maintained!

Overall Goal:

...and we call these trees:

AVL Trees:





Theorem: If an insertion occurred in subtrees $\mathbf{t_3}$ or $\mathbf{t_4}$ and a subtree was detected at **t**, then a _____ rotation about t restores the balance of the tree.

CS 225 – Things To Be Doing:
Exam #6 upcoming, lab_huffman due Sunday, MP4 due Monday after next