# EECE.3220: Data Structures

Key Questions

BSTs and Balanced Trees (Lectures 31-33)

**QUESTIONS**

1. Describe the BST algorithms for searching, inserting a node, and deleting a node.
2. Review AVL trees, particularly the rules for keeping them balanced and the idea of a balance factor.
3. What is a tree "rotation?" What are the four different types of rotations?
4. Review red/black trees, particularly the rules for keeping them balanced.

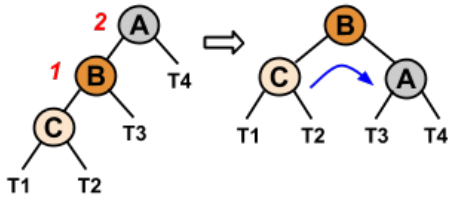
**EXAMPLES**

1. Build a BST using the letters from the word "PROBLEMS," assuming they're added in order starting with the letter 'P'.

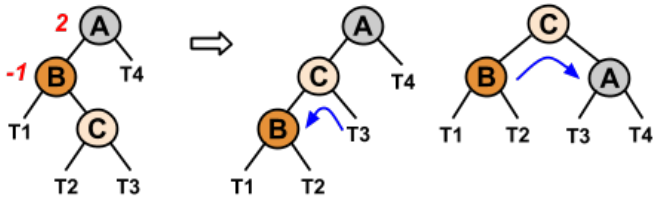
   Then, show how the tree changes after deleting the letters S, B, and P, in that order.

2. Build an AVL tree using the letters from the word "PROBLEMS," assuming they're added in order starting with the letter 'P'. Then remove the letter 'B' and rebalance the tree.

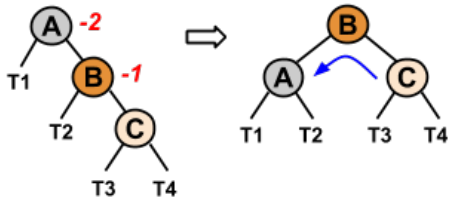
The four types of tree rotations you may need are shown below. Note that these diagrams assume a node has just been added, so these balance factors are shown immediately after adding data:



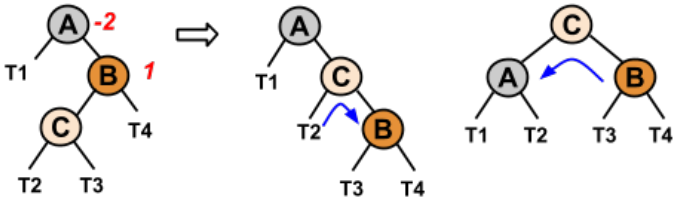

Left-left (2, 1) case




Left-right (2, -1) case




Right-right (-2, -1) case




Right-left (-2, 1) case