We know the **height** of a tree.
We know if a tree is **full**, **complete**, and/or **perfect**.
We know that every binary tree has ________ NULL pointers.
We know many **traversals** of trees.
We know that a **BST’s height is bound by n** such that:
\[ _____ \leq h \leq _____ \]
We know all key **BST operations run in O(h)** time.
We know a BST can be used to **implement a Dictionary**.
We know that a **random BST has an average height** of _____.
We know that an **inorder traversal** of a BST is a __________.
We know **how to implement a BST** in C++.
Height-Balanced Tree

What tree makes you happier?

Height balance: \( b = \text{height}(T_R) - \text{height}(T_L) \)

A tree is height balanced if:
BST Rotation

We will perform a rotation that maintains two properties:

1.

2.
BST Rotation Summary

- Four kinds of rotations (L, R, LR, RL)
- All rotations are local (subtrees are not impacted)
- All rotations are constant time: \( O(1) \)
- BST property maintained

**GOAL:**

We call these trees:
AVL Trees

Three issues for consideration:
- Rotations
- Maintaining Height
- Detecting Imbalance
Theorem:
If an insertion occurred in subtrees $t_3$ or $t_4$ and a subtree imbalance was detected at $t$, then a __________ rotation about $t$ restores the balance of the tree.

We gauge this by noting the balance factors:
- $t$: $b=______$
- $t\rightarrow\text{right}$: $b=______$
CS 225 – Things To Be Doing

Exam 5 (Theory) is ongoing!
More Info: https://courses.engr.illinois.edu/cs225/fa2017/exams/

MP4: Available later today!
Due: Monday, Oct. 23 at 11:59pm

Lab!
Due: Sunday, Oct. 15 at 11:59pm

POTD
Every Monday-Friday – Worth +1 Extra Credit /problem (up to +40 total)