

15-110 Recitation Week 8

Reminders

- Quiz 3 tomorrow!
- Hw4
 - Partial was due today at Noon!
 - Full due Monday 3/21 at Noon
 - Code reviews for HW 4 (will be available Monday)
- Check3/HW3 revisions due today at Noon!
- Reminder to fill out mid-semester surveys for HW4 **extra points - due with HW4 full!**
- Recitation feedback form: <https://forms.gle/v4K9nWWk7oKTtZ6Aa>

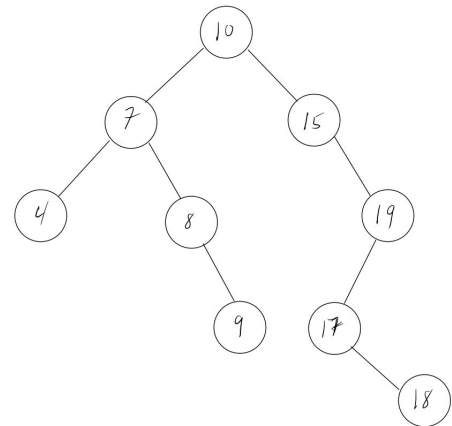
Overview

- Binary Search Tree Tracing
- Binary Search Tree Efficiency
- Graphs Searching Practice
- Tractability, P vs. NP

Problems

BINARY SEARCH TREES

What constraints does a binary search tree follow ?



Is the tree on the right a BST? Explain why.

What elements would you look through to find the value of 17?

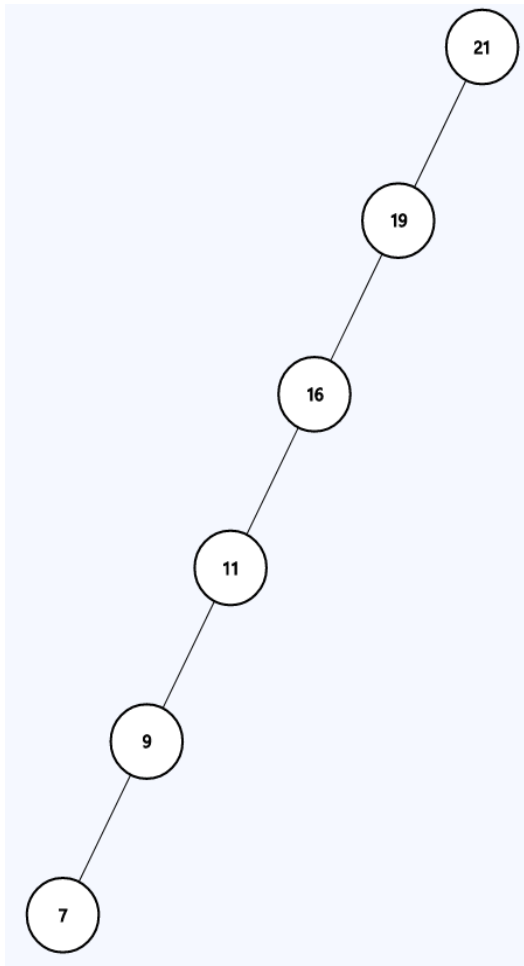
What elements would you look through to find the value of 11?

BINARY SEARCH TREE EFFICIENCY

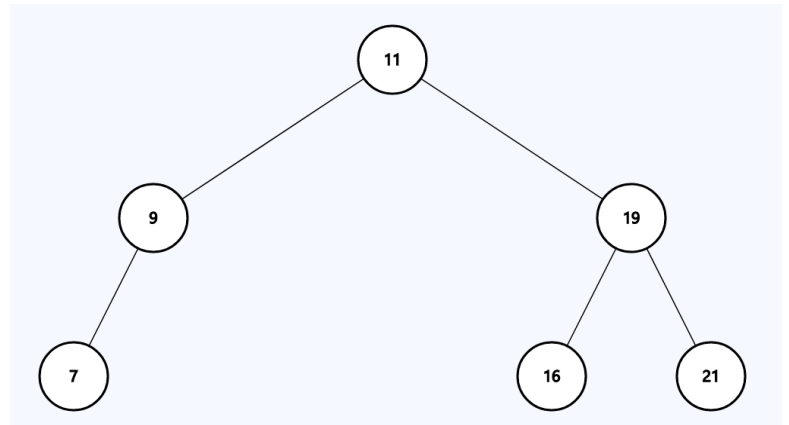
What does it mean for a tree to be balanced?

Consider these two BST's with the exact same values in them, one is balanced while the other one is not balanced (skewed).

Unbalanced



Balanced



How many nodes would we visit if we searched each tree for the value of 1?

a. Unbalanced _____

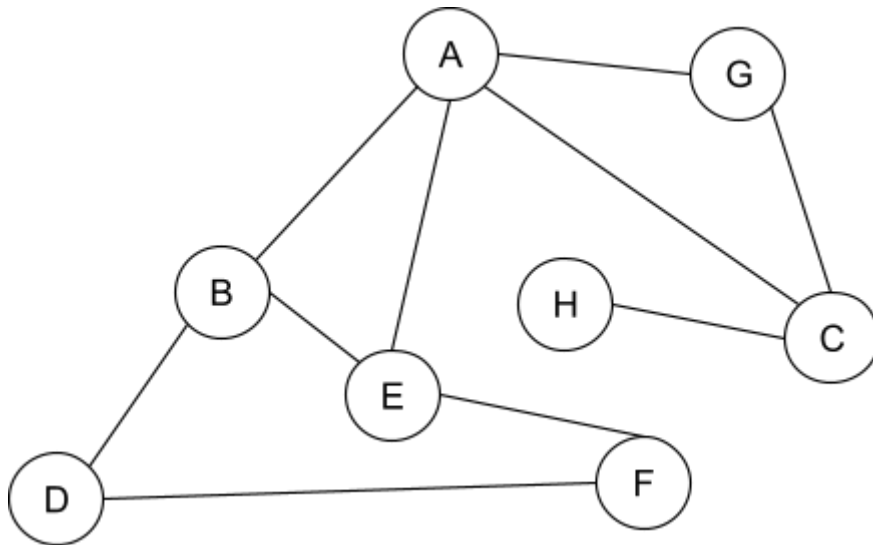
b. Balanced _____

In general, what is the runtime to search an unbalanced tree vs a balanced tree?

a. Unbalanced _____

b. Balanced _____

GRAPHS SEARCH



Given the above graph, use both BFS and DFS to find the element **W** starting at node **A**. List out all the values you would visit, and visit nodes in alphabetical order.

BFS:

DFS:

TRACTABILITY & P VS. NP

Notes:

| | P | NP |
|-----------|---|----|
| Verifying | | |
| Solving | | |

Quick True/False Questions:

Problems in P can be solved in polynomial time _____

Problems in NP can be solved in polynomial time _____

Some intractable problems are in P _____

All problems in P are in NP _____

Linear Search is in NP _____

Puzzle solving is in NP _____

Exam Scheduling is in P _____

If you can find a tractable solution to any useful NP problem, you prove $P=NP$ _____