Announcements

Final exam: Thursday 12/19 1:30-4:30pm
4025 Campus Instructional Facility

Wed. class will be review

Policies/practice problems to come later

Recall:

A tree is a conn. (undir.) graph w/ no simple circuits

A rooted tree is a tree in which one vertex has been designated the root

A rooted tree is called a binary tree if every internal vertex has ≤ 2 children.

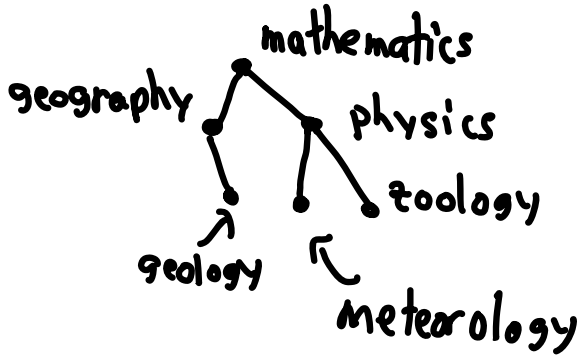
Binary search trees

Suppose we have a list of words, which we want in alphabetical order

Add them to a binary tree, such that

left child < parent < right child

Ex 1: {mathematics, physics, geography, zoology, meteorology, geology, psychology, chemistry}



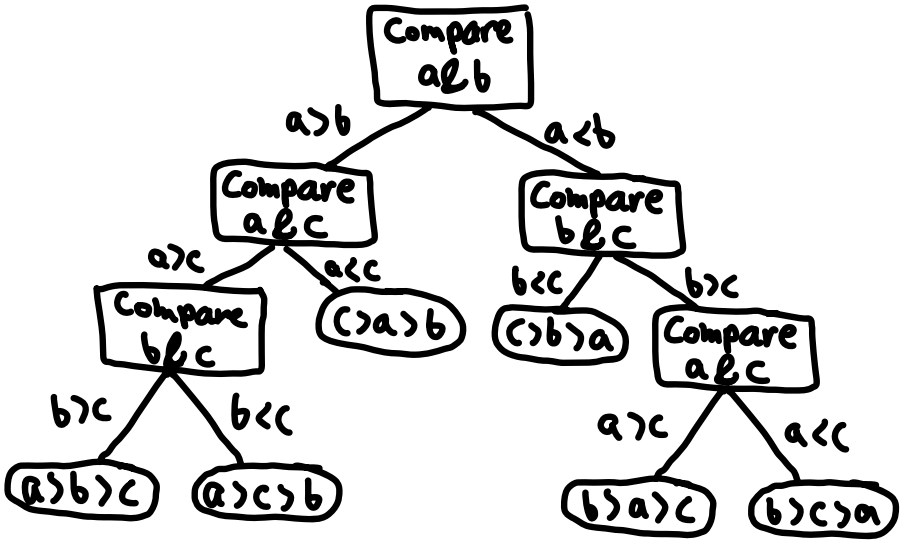
Class activity finish this tree.

We can use this tree to read off the words in order or to determine whether a word is in the list (e.g. geology, oceanography)

Decision trees

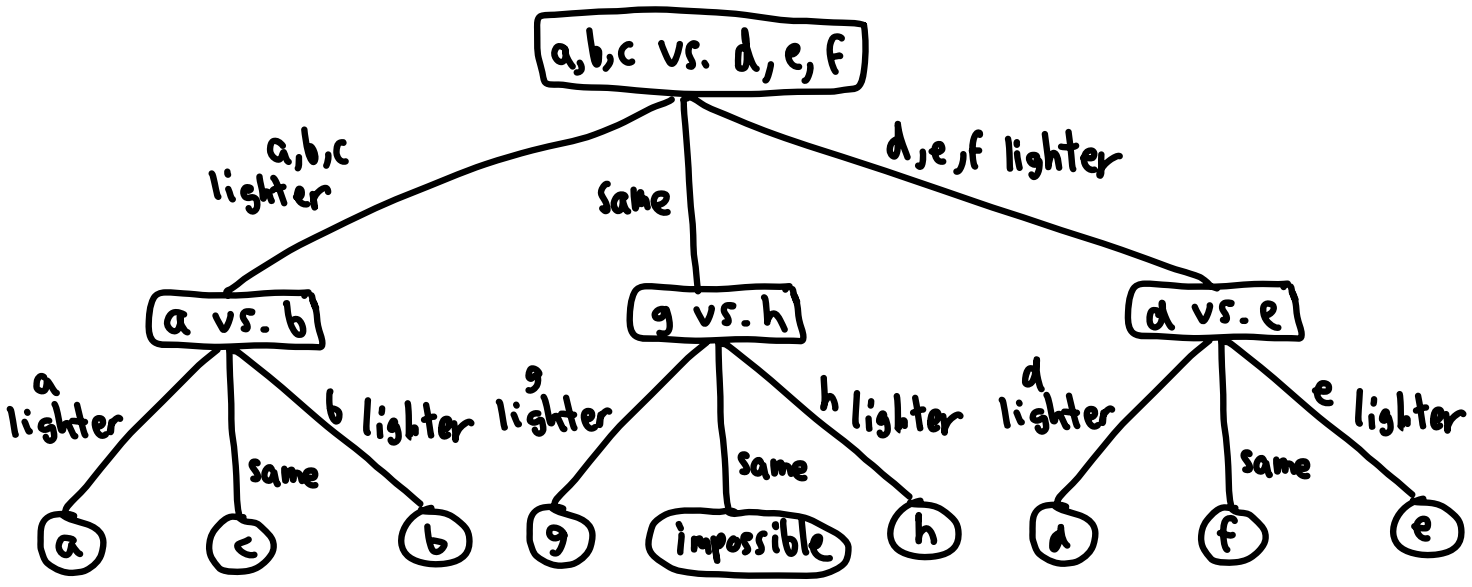
A decision tree is a rooted tree where each internal vertex corresponds to a decision, and this decision moves us to one of the two children. The leaves are the "conclusions"

Ex 4: a, b, c are three distinct numbers. Give a decision tree that orders a, b, c.



(If time) Ex 3: Suppose there are 7 coins, all w/ the same weight, and a counterfeit coin that weighs less than the others. How many weighings are needed to determine the counterfeit coin?

Coins: a, b, c, d, e, f, g, h



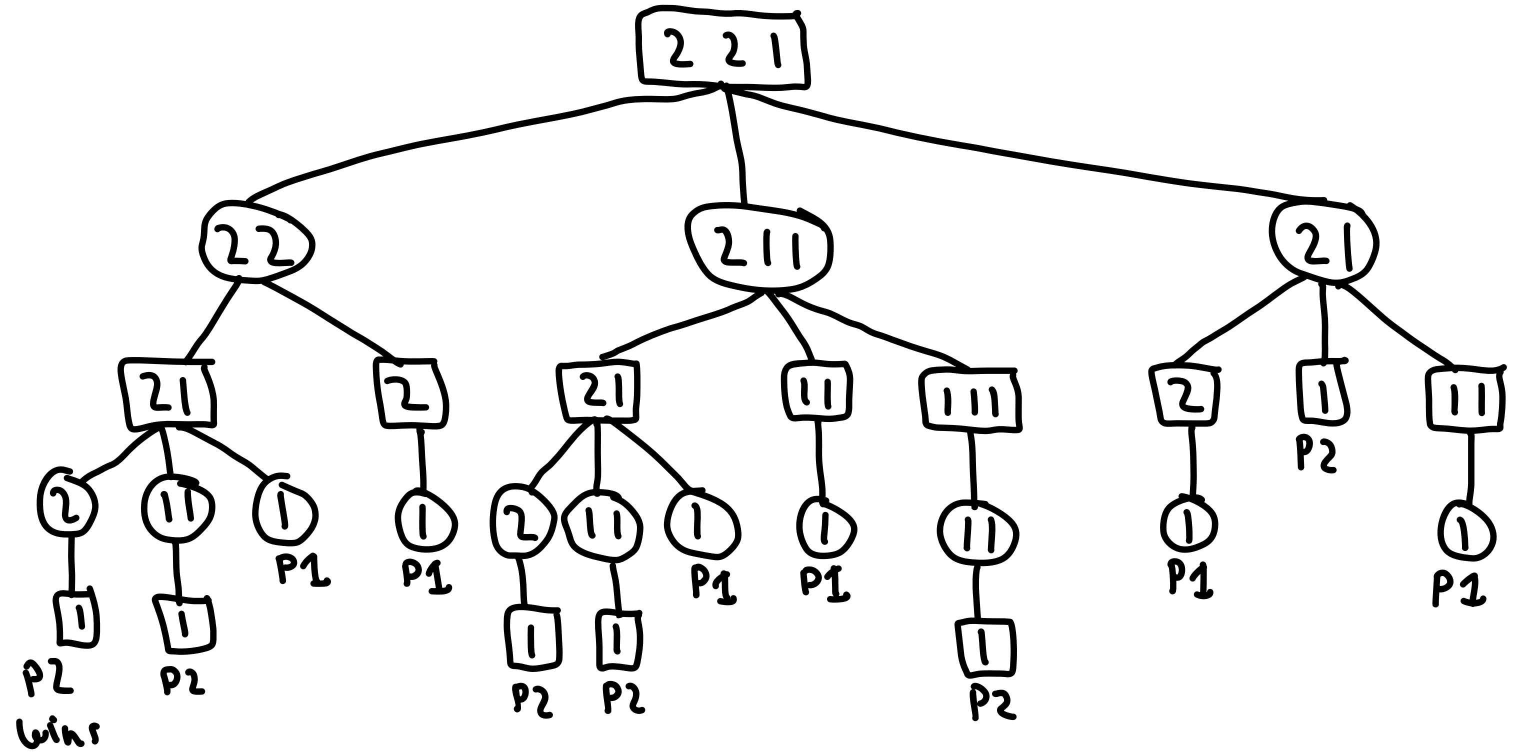
Game trees

A game tree is a decision tree where the decisions are made at the discretion of 2 or more (alternating) players

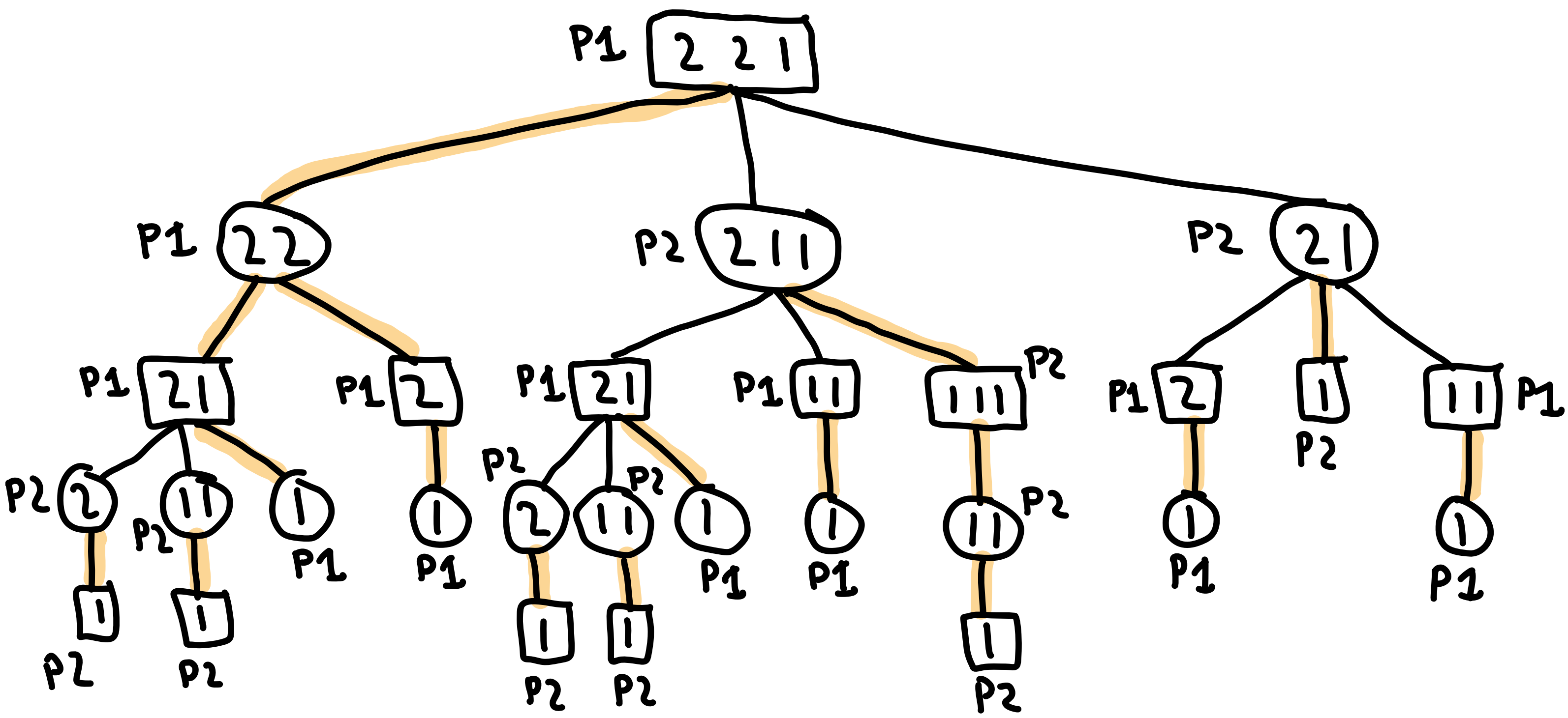
Ex 6: Nim:

2 players
Several piles of stones
Players alternate turns
For each turn, a player takes 1 or more stones from one of the piles such that at least one stone remains
The first player who can't move loses!

Start w/ three piles, containing 2, 2, 1 stone(s)



Can use the game tree to see who can force a win, and how



: best move(s)