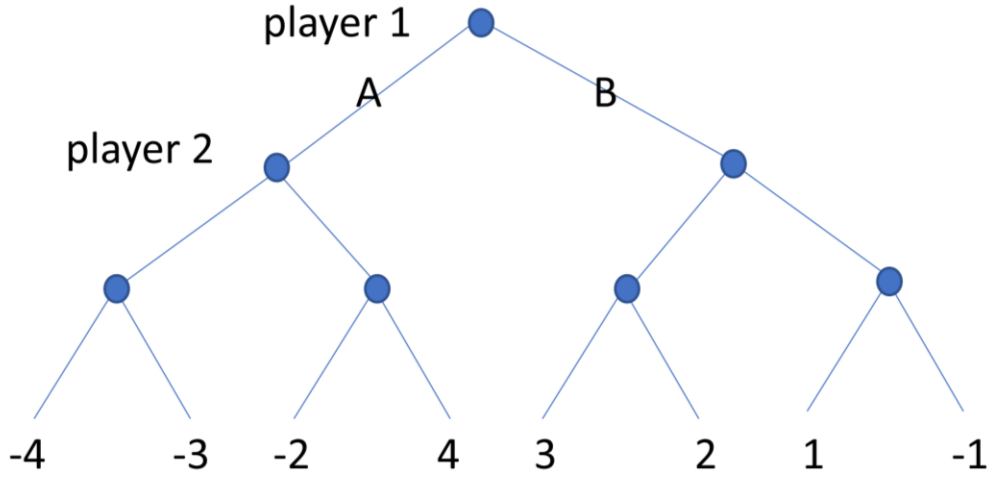
CSCE 420 - Fall 2024
Homework 2 (HW2)
due: Tues, Oct 4, 11:59 pm

Turn-in your answers as a Word document (HW2.docx or .pdf), and commit/push it to your class github repo in the HW2 folder.

1. Consider the simple game tree below (binary, depth 3).



1a. Label the nodes with up or down arrows, as discussed in the textbook .

1b. Compute the *minimax* values at the internal nodes (write the values next each node).

1c. Which action, A or B, is optimal for player 1 to take?

1d. What is the expected outcome (payoff at the end of the game)?

1e. Which branches would be pruned by alpha-beta pruning? (circle them)

1f. How could the leaves be relabeled to maximize the number of nodes pruned? (you can move the utilities around arbitrarily to other leaves, but you still have to use the same values: -4,-3,-2,-1,+1,+2,+3,+4)

1g. How could the leaves be relabeled to eliminate pruning?

2. Hiking Philosophers.  Three philosophers, Alex (A), Bob (B), and Charlie (C), are going on a hike and need to decide the order in which they will hike. Alex and Charlie have PhDs, while Bob has a MS degree. Adjacent hikers in the sequence have to have different degrees. Finally, Charlie does not want to be last.

a) Show how to set this up as a Constraint Satisfaction Problem. (what needs to be defined?)

b) Draw the Constraint Graph (label all nodes and edges)

c) Trace how plain Backtracking (BT) (with no heuristics) would solve this problem, assuming values are processed in *alphanumeric* order. Identify instances where back-tracking happens.

d) Trace how BT would solve this problem using the MRV heuristic.