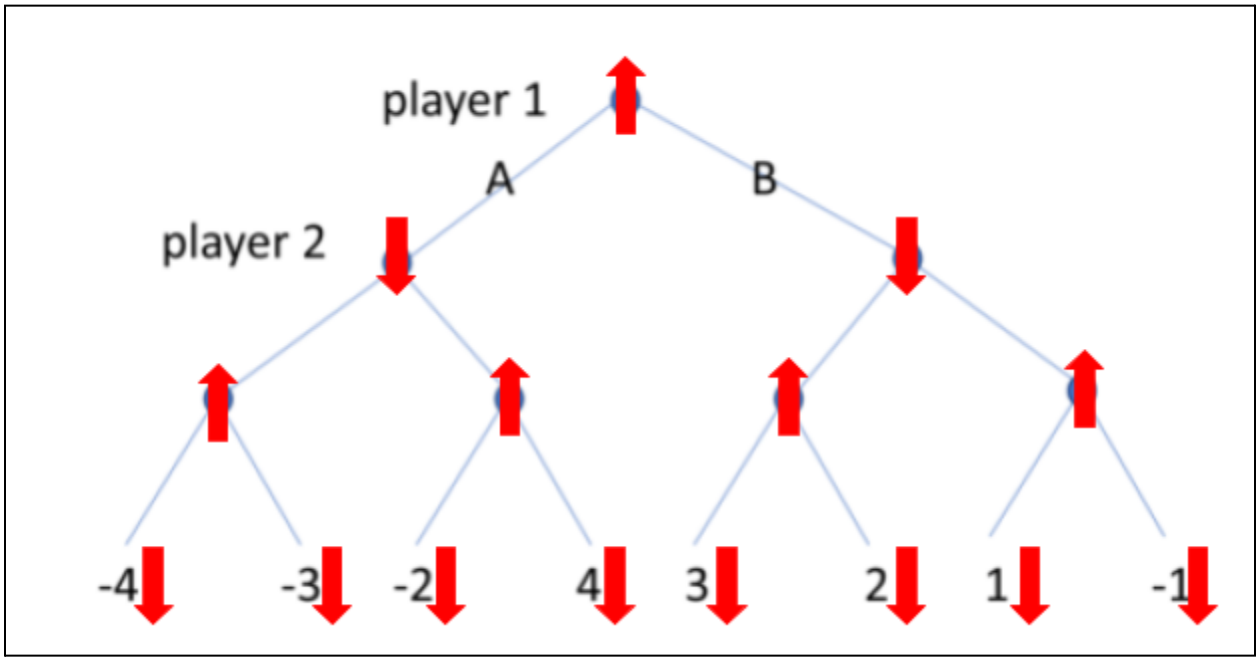
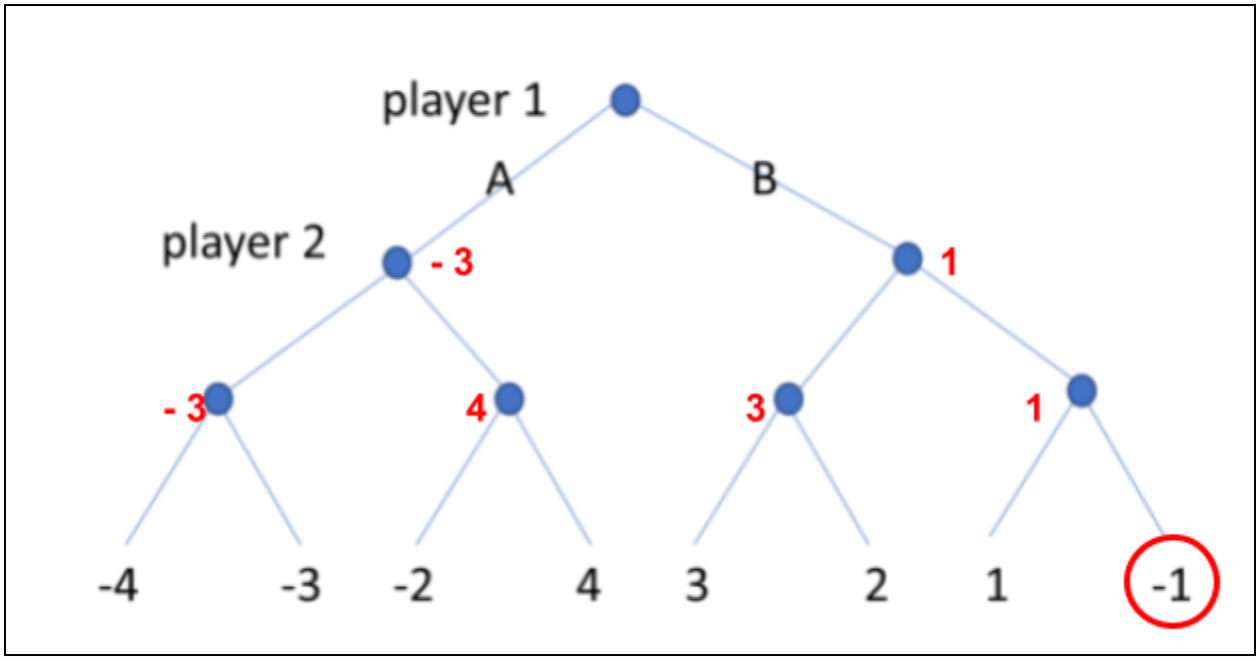
Samuel Fafel - CSCE 420 - Homework 1

QUESTION 1:
Labeled with Arrows:



Minimax Values and Alpha-Beta Pruning on Original Tree:



Player 1 should choose Path B with an expected outcome of +1

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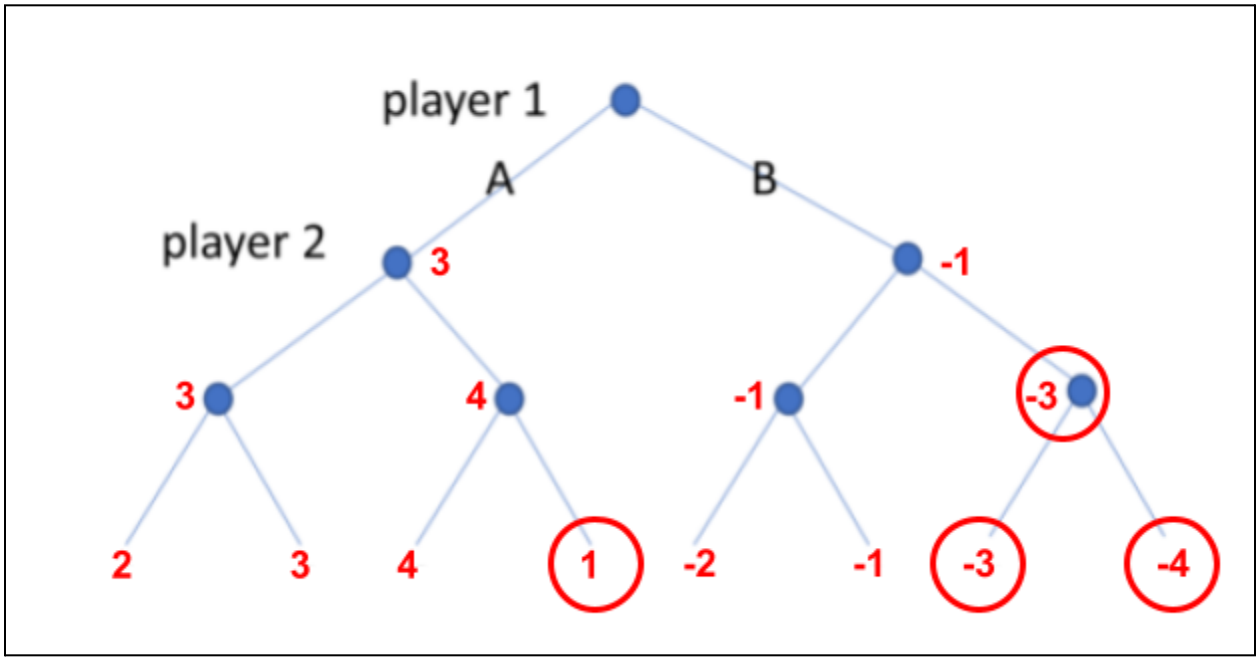
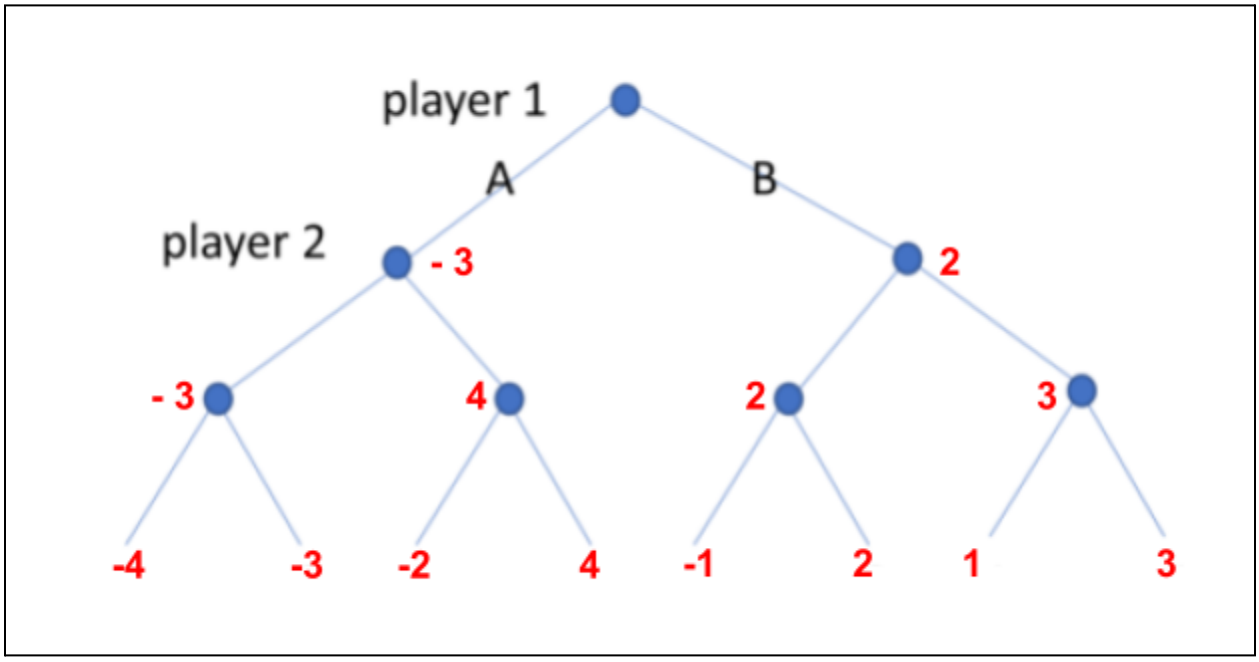
To maximize Alpha-Beta:



To eliminate Alpha-Beta:



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QUESTION 2:

- The player at the root could never force a win, since the other player would always make the final move. It does not matter where the 2 non-zero states are.
- Given the scenario of only 2 non-zero states, and only 1 winning state for each player, it is impossible for either player to force a win, no matter where the winning states are, and no matter the depth. (except for a trivial depth of 1) Even if the states are adjacent to each other, the player who moves second-to-last would choose a draw over giving the last player the opportunity to win. If the states are not adjacent, it is also always a draw.

QUESTION 3:

a) Variables: X(i) is the hiker in the (i)'th position. Where i = 1,2,3

Domains:

Each variable can be assigned to exactly one hiker:

D(X1) = D(X2) = D(X3) = {A, B, C} *(Alex, Bob, Charlie)*

Constraints:

Adjacent hikers cannot have the same degree:

(1) If X1 = A then X2 ≠ C

(2) If X1 = C, then X2 ≠ A

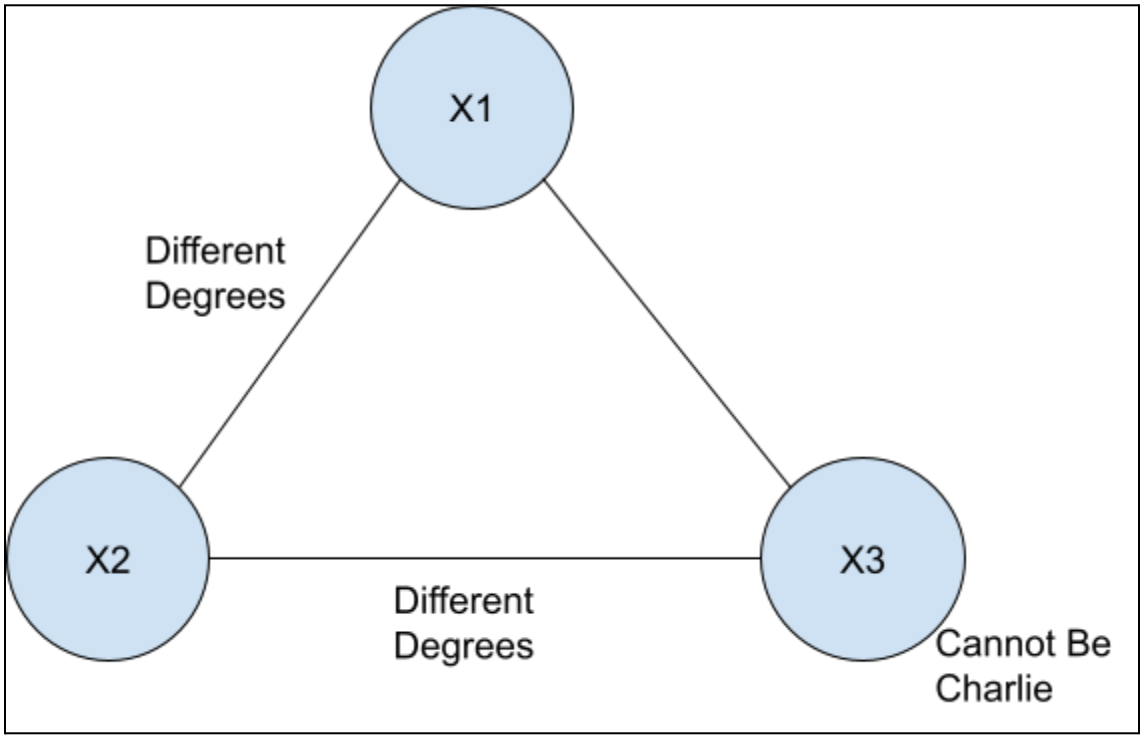
(3) If X2 = A then X1 ≠ C, X3 ≠ C,

(4) If X2 = C then X1 ≠ A and X3 ≠ A

Charlies does not want to be last:

(5) X3 ≠ C

b)



c) Try: X1 = A

Try: X2 = B

Try X3 = C *(Violates Charlie last constraint (5))*

Backtrack:

Try: X2 = C *(Violates same degree constraint (4))*

Try: X1 = B

Try: X2 = A:

Try X3 = C *(Violates same degree constraint (3))*

Backtrack:

Try: X2 = C

Try X3 = A *(Violates same degree constraint (4))*

Try: X1 = C

Try: X2 = A

Try X3 = B *(Violates same degree constraint (3))*

Backtrack:

Try: X2 = B

Try: X3 = A *(No violations, valid)*

Only Valid Solution: {X1, X2, X3} = (C,B,A)