

Homework 2: Game Playing (due October 12, 11:59pm)

Please read the rules for assignments on the course web page (<http://www2.cs.duke.edu/courses/fall21/compsci570/>). Please use Ed Discussion for questions (use private questions if your question is likely to reveal part of the answer to others). Use Gradescope to turn this in.

In class we considered some two-player zero-sum games with 8 leaves. Now consider games with 16 leaves, where the sequence of moves is P1 - P2 - P1 - P2, each with a binary choice (so one more level than the ones on the slides). Consider the alpha-beta algorithm and assume it always goes from left to right in the picture (left branches are always explored before right branches).

1. Write down 16 numbers for player 1's utility such that, if these are the utilities from left to right, as few nodes as possible are pruned by alpha-beta. You will get points for every node that is not pruned.
2. Write down 16 numbers for player 1's utility such that, if these are the utilities from left to right, as many nodes as possible are pruned by alpha-beta. You will get points for every node that is pruned.

Note that this means that P1 is a maximizer and P2 is a minimizer. For example, the example in Figure 1 will earn 12 points for the first question and 4 points for the second question.

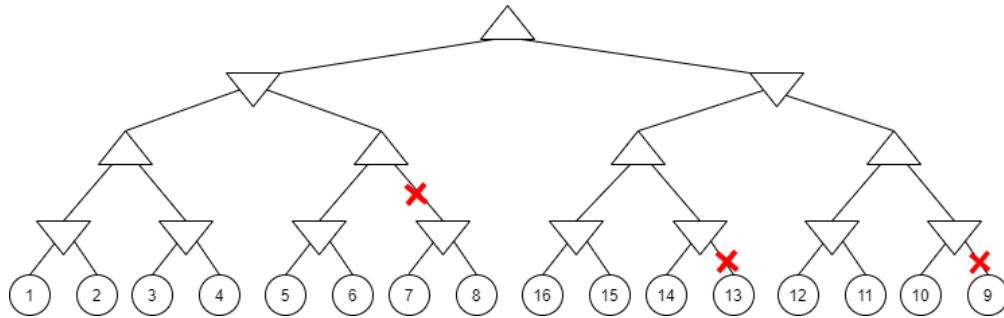


Figure 1: An example, corresponding to the input 1 2 3 4 5 6 7 8 16 15 14 13 12 11 10 9

Hint: consider the remarks on the slide about how many nodes alpha-beta examines.