1. Consider the following game tree, which you can also find at https://www.cs.cornell.edu/courses/cs4700/2020sp/quizzes/MOM.JPG. What are the values of nodes A-G?

Let’s work from bottom up:
- D = 2, E = 4, F = 6, G = 8
- B = 2, C = 6
- A = 6

2. There were two possible questions:
   - Consider the following game tree below, also available at https://www.cs.cornell.edu/courses/cs4700/2020sp/quizzes/MMO.JPG, that depicts a game where the players don’t alternate turns but rather I make two consecutive moves and then my opponent makes one move.

Which move should I make (enter "L" or "R")?
R, because it results in 7. (L results in 3.)

What is the value of node A?
Let’s work from bottom up:
- D = 1, E = 3, F = 5, G = 7
- B = 3, C = 7
- A = 7

- Consider the following game tree below, also available at https://www.cs.cornell.edu/courses/cs4700/2020sp/quizzes/MOO.JPG, that depicts a game
where the players don’t alternate turns but rather I make one move and then my opponent makes two consecutive moves.

Which move should I make (enter "L" or "R")?
R, because it results in 5. (L would result in 1.)

What is the value of node A?
Let’s work from bottom up:
- D=1, E=3, F=5, G=7
- B=1, C=5
- A=5

3. There were two possible questions:
   - Consider the game tree shown below, which is also available at https://www.cs.cornell.edu/courses/cs4700/2020sp/quizzes/MOM1.JPG. The evaluation function for terminal nodes in this game always returns an integer in the range of 1 to 8 (inclusive).

   What value must Y be so that node G is pruned by alpha-beta pruning regardless of the value that X takes on?

   G will get pruned if \( Y \leq \min(\max(8,7),\max(6,X)) = \min(8,\max(6,X)) \). If X is 6 or less this becomes \( \min(8,6)=6 \); if X is 7 this becomes \( \min(8,7)=7 \); if X is 8 this becomes \( \min(8,8)=8 \). In other words, the only three values the left subtree of A can have are 6, 7, and 8. Pruning happens if Y is less than or equal to the value of the left subtree and any value for Y between 1 and 6 inclusive guarantees that for any value of X G gets pruned.

   - Consider the game tree shown below, which is also available at https://www.cs.cornell.edu/courses/cs4700/2020sp/quizzes/MOM2.JPG. The evaluation
function for terminal nodes in this game always returns an integer in the range of 1 to 8 (inclusive).

What value must $Y$ be so that node $G$ is guaranteed to NOT be pruned by alpha-beta pruning regardless of the value that $X$ takes on?

$G$ will not be pruned if $Y > \min(\max(7,6),\max(5,X)) = \min(7,\max(5,X))$. If $Y$ is 7 or less then pruning will happen if $X$ is 7 or 8. The only value of $Y$ for which no pruning happens for any value assigned to $X$ is if $Y$ is 8.