1. Consider the following complete game tree for a simple (trivial) nondeterministic game. The circles represent chance nodes. The squares are terminal states.

Assume that the leaf nodes are evaluated in left-to-right order, and that you know nothing about them until they’ve been evaluated.

(3 pts)  (a) Redraw the figure, indicating the value of all the internal nodes and clearly indicating the best move from the root.

(2 pts)  (b) Given the values of the first six leaves, do we need to evaluate the seventh and eighth leaves? Given the value of the first seven leaves, do we need to evaluate the eighth? Justify your answers.

(1 pts)  (c) Suppose that leaf node values are known to lie between -2 and 2 inclusive. After only the first two leaves are evaluated, what is the value range for the left-hand chance node?

(1 pts)  (d) Which leaves do not need to be evaluated under the assumption in part (c)?
2. Consider the following procedure for choosing moves in a game involving dice rolls.

- Generate some dice roll sequences (say 50), of a sufficient length (depth) for the game (say 8).
- With known dice rolls, the game tree becomes deterministic. For each dice roll sequence, solve the resulting deterministic game tree (for example using MINIMAX with alpha-beta).
- Use the results to estimate the value of each move and to choose the best.

Is this procedure correct? Why or why not? What’s the alternative?

3. Which of the following are true and which are false. Briefly explain your answers.

(a) In a fully-observable, turn-taking, zero-sum game between two perfectly rational players, it does not help the first player to know what strategy the second player is using—that is, what move the second player will make, given the first player’s move.

(b) In a partially-observable, turn-taking, zero-sum game between two perfectly rational players, it does not help the first player to know what move the second player will make, given the first player’s move.

(c) A perfectly rational backgammon agent never loses.