CS 4100: Foundations of Artificial Intelligence (Fall 2021) — Chris Amato

Student: — Due October 07, 2021

Search and Adversarial Search

1 Search

1. Consider the graph shown in the figure below. Perform tree-based search for the following algorithms. The agent starts at node s and the goal-state is g.

   (a) BFS

   (b) DFS

   (c) UCS

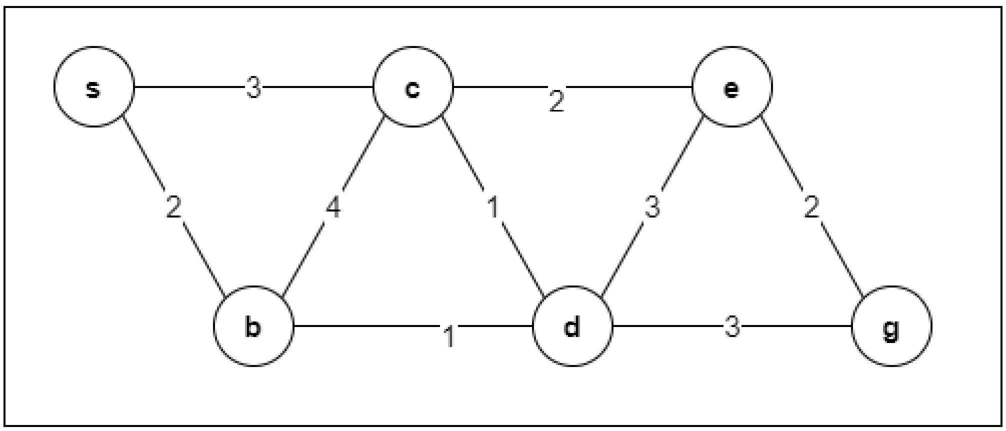

Figure 1: Graph A

1. Consider the graph shown in the figure below. Perform tree-based A* on the graph. In what order does A* expand the nodes for the graph? The agent starts at node s and the goal-state is g.

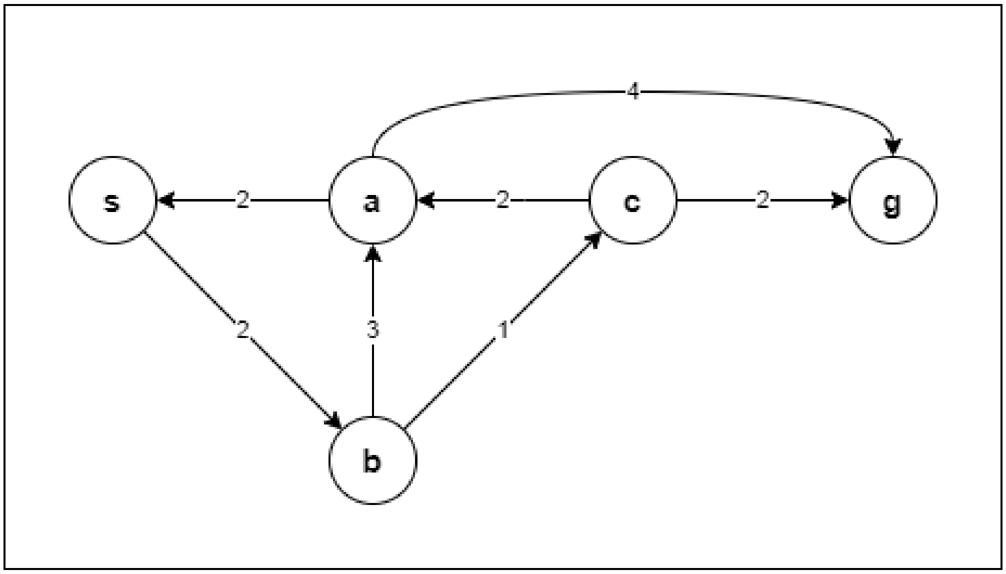

Figure 2: Graph B

2 Adversarial Search

Suppose you have an oracle, MO(s), that correctly predicts the opponent's move in any state. Using this, formulate the definition of a game as a (single-agent) search problem. Describe an algorithm for finding the optimal move.

Which of the following are true and which are false? Give **brief** explanations.

(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.

3 Minimax

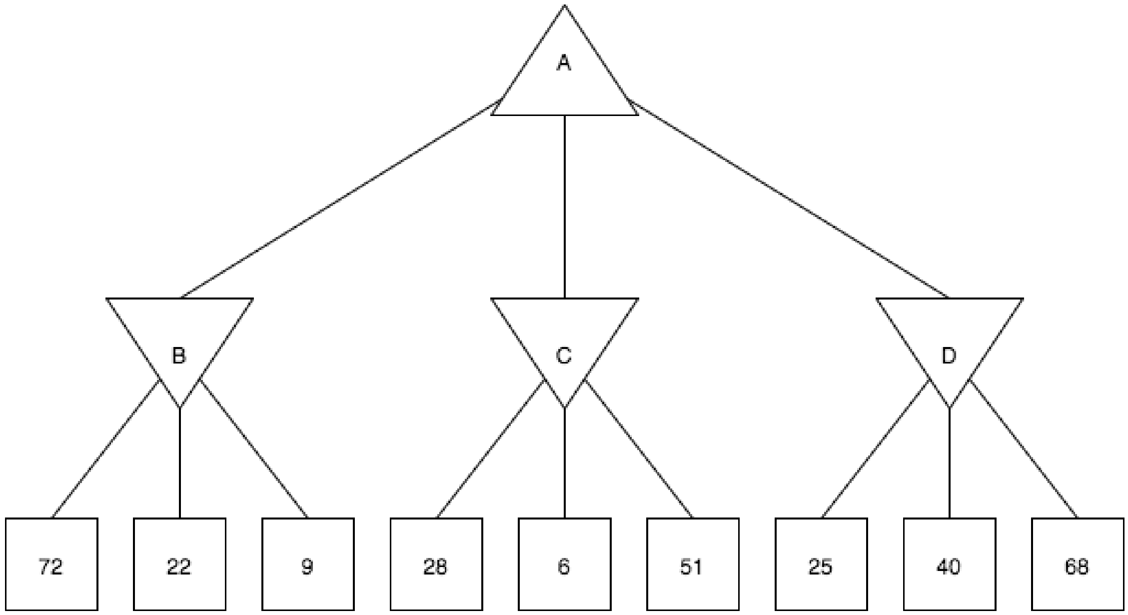

Figure 3: Minimax

(a) For the Minimax tree above, what is the value of A,B,C,D?

A:
B:
C:
D: