

Final exam: CS 3331 – Fundamentals of Artificial Intelligence

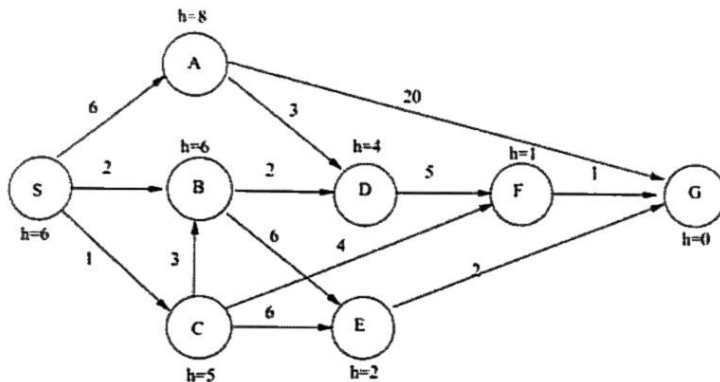
Duration: 60 minutes

The exam is an opened book, closed computer and non-programmable calculators only; Copied answers from others will be deducted points for all of these students

Hanoi, 20 January, 2026

Problem 1. (2 points) Give an example of Heuristic/ evaluation function of a game and explain it briefly.

Problem 2. (3 points) Consider the search problem below with start state S and goal state G. The transition costs are next to the edges, and the heuristic values are next to the states.



- (1) What is the final path for this DFS search? If a node has multiple successors, then we always expand the successors in increasing alphabetical order.
- (2) What is the final path for this A* search? Explain by steps in details.

Problem 3. (2 point)

The single most important idea in formal logic is that the meaning of a sentence can be represented as a set-theoretic set of possible worlds. Given a universe with propositional symbols P, Q, R and S, how many interpretations are there in the meaning of the following KB?

$$\begin{aligned} (P \wedge Q) &\Rightarrow (R \wedge S) \\ (P \wedge Q) &\vee (R \wedge S) \\ \sim (P \wedge Q) &\Rightarrow (\sim P \vee \sim Q) \end{aligned}$$

Problem 4. (3 points)

Consider the following Knowledge base (KB) as follows:

$$\begin{aligned} \exists u. \quad & \text{Tenured}(u) \\ \forall r. \quad & \text{Tenured}(r) \Rightarrow \text{Fat}(r) \\ \forall w. \quad & \text{Fat}(\text{Boss}(u)) \Rightarrow \text{Fat}(w) \\ & \text{Boss}(\text{Andrew}) = \text{Bob} \\ & \sim \text{Tenured}(\text{Bob}) \end{aligned}$$

- (1) Is "Fat" a predicate symbol, a function symbol, or a constant symbol? Explain by steps in details.
- (2) Is "Boss" a predicate symbol, a function symbol, or a constant symbol? Explain by steps in details.