

السؤال الرابع عشر



Damietta University
Faculty of Science

Final Term Exam
June 2023-2024

Level 4 Computer Science
90 Marks
Course: Advanced topics in AI
Course Code: 412
Date: Sunday 2/6/2024

Exam Instructions:

- 1- Answer the required questions only, to Save time.
- 2- Use a blue or black pen to answer the questions.

The Exam consists of (3) pages - (3) questions

Answer the following questions:

Question ONE:

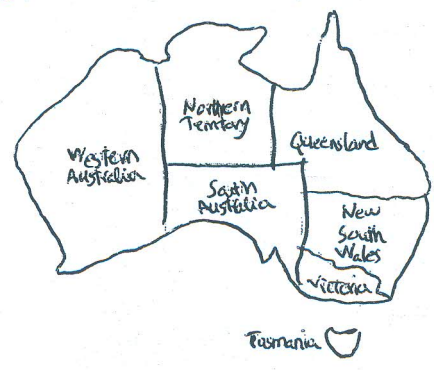
(30 Marks)

- (1) Define: (a) agent (b) logical reasoning.
- (2) For each of the following assertions, say whether it is True or False and support your answer with examples:
 - (a) An agent that senses only partial information about the state cannot be perfectly rational.
 - (b) The input to an agent program is the same as the input to the agent function.
 - (c) A perfectly rational poker-playing agent never loses.
- (3) Give example for Iterative deepening depth-first search on binary search tree.
- (4) Prove each of the following statements, or give a counterexample:
 - (a) Breadth-first search is a special case of uniform-cost search.
 - (b) Depth-first search is a special case of best-first tree search.
 - (c) Uniform-cost search is a special case of A* search.

Question TWO:

(30 Marks)

- (1) Write the *elements* of game formal definition.
- (2) Describe how the **minimax** and **alpha-beta** algorithms change for two-player, non-zero-sum games in which each player has a distinct utility function and both utility functions are known to both players. If there are no constraints on the two terminal utilities, is it possible for any node to be pruned by alpha-beta?
- (3) Define Constraint Satisfaction Problems (CSP).
- (4) Discuss briefly Map coloring problems as a CSP, use the following figure.



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Question THREE:

(30 Marks)

- (1) Give precise formulations for each of the following as CSPs:
- (a) Rectilinear floor-planning: find non-overlapping places in a large rectangle for a number of smaller rectangles.
 - (b) Class scheduling: There is a fixed number of professors and classrooms, a list of classes to be offered, and a list of possible time slots for classes. Each professor has a set of classes that he or she can teach.
 - (c) Hamiltonian tour: given a network of cities connected by roads, choose an order to visit all cities in a country without repeating any.
- (2) Discuss briefly: constraint, Backtracking search, Min-conflicts and cycle-cutset of the CSP.
- (3) Which of the following are correct? Why?
- (a) $(A \vee B) \wedge \neg (A \Rightarrow B)$ is satisfiable (b) $(A \wedge B) \Rightarrow C \models (A \Rightarrow C) \vee (B \Rightarrow C)$.
- (4) Discuss how to construct Wumpus world agents that use propositional logic.

With my best wishes

Examiner:

Dr. Heba El Hadidi