

國立交通大學試題紙

九十九學年度第二次
博士班資格考

科目：人工智慧(A)

日期：100 年 7 月 27 日 第 1 頁 共 1 頁

請 “✓” 明 ✓不可看書 可看書

* 請將答案依題號順序寫入答案卷

答題時字跡需工整，否則不予計分。Write your answers legibly; otherwise you will get zero score.

Please be precise and concise.

1. (10pts) Explain the need for “inductive bias” and give two examples of inductive bias.
2. (12 pts) If the class distribution in a dataset is skewed, e.g., the number of positive examples is much bigger than that of negative examples, we have the “class imbalance” problem. Describe two approaches to alleviate the problem.
3. (16 pts) Discuss the pros and cons of Decision Tree and Artificial Neural Net in terms of flexibility, accuracy, comprehensibility, learning/prediction efficiency.
4. (12 pts) The department Chair is calling for designs for a Robot Navigation System that will drive a patrol robot in our Computer Science Department building. Due to government budget cut, you have only limited fund. As a computer scientist with AI background, you are aware of two alternative approaches to the design of Robot Navigation System, Learning and Planning. Briefly discuss your design concerns according to Learning and Planning.

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科目：人工智慧(B)

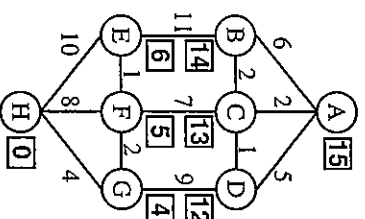
日期：100 年 7 月 27 日 第 1 頁 共 2 頁

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答題時字跡需工整，否則不予計分。Write your answers legibly; otherwise you will get zero score.

1. (5%) Both the performance measure and the utility function measure how well an agent is doing. Explain their difference in detail.
2. (5%) Describe a state space in which iterative deepening search performs much worse than depth-first search (for example, $O(n^2)$ vs. $O(n)$).
3. (15%) For the state space on the right, the path costs are shown on the links and the heuristic costs are shown in the box beside each state. The start state is A and the goal state is H. All search strategies are assumed to obey the following two rules:
 - When a node is expanded in the search tree, its ancestor nodes are not added as children nodes.
 - When two or more nodes have the same cost in the queue, they are expanded in the same order with which they were inserted into the queue.



For the following search strategies, draw the search tree, give the node expansion order as a state sequence, and the final path with the cost.

- (a) Uniform-cost search
- (b) Greedy best-first search
- (c) A^* search

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科目：人工智慧(B)

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4. (10%) True or false (1% each)? No need to explain. \otimes denotes XOR.

- | | |
|--|--|
| (a) $False \models False$ | (f) $(A \Leftrightarrow B) \models (A \wedge B)$ |
| (b) $False \models True$ | (g) $(A \vee B) \models (A \Leftrightarrow B)$ |
| (c) $True \models False$ | (h) $(A \Leftrightarrow B) \models (A \vee B)$ |
| (d) $True \models True$ | (i) $(A \Leftrightarrow B) \models (\neg A \vee B)$ |
| (e) $(A \wedge B) \models (A \Leftrightarrow B)$ | (j) $(A \Leftrightarrow B) \equiv \neg(A \otimes B)$ |

5. (15%) Is each of the following propositional or first-order logical sentences valid, satisfiable, or unsatisfiable (1% each)? Explain (2% each).

- (a) $Smoke \Rightarrow Fire$
- (b) $(Smoke \Rightarrow Fire) \Rightarrow (\neg Smoke \Rightarrow \neg Fire)$
- (c) $\exists x, y \ x = y$
- (d) $\forall x, y \ x = y$
- (e) $\forall x, y \ \neg(x = y)$