

科目：計算理論 A

日期：106 年 7 月 26 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.

1. (20%) Let $L = \{ \langle M_1 \rangle \langle M_2 \rangle : M_1, M_2 \text{ are Turing machines such that } L(M_1) \cap L(M_2) \neq \emptyset \}$, where $\langle M \rangle$ is the standard encoding of Turing machine M .
 - a) Show that L is not recursive by the reduction method from the halting problem.
 - b) Show that L is recursively enumerable by giving the enumeration method.
2. (30%) Let the language $CLIQ = \{ (G, k) : \text{the undirected graph } G \text{ has a clique of size } \geq k \}$ and $3SAT = \{ F : F \text{ is a satisfiable Boolean formula that is in conjunctive normal form and each clause contains exactly 3 literals} \}$
 - a) Show that $CLIQ$ and $3SAT$ are both in NP .
 - b) Define “NP-complete” formally?
 - c) Assume that $3SAT$ is NP-complete. Show that the language $CLIQ$ is also NP-complete.
 - d) Assume that $CLIQ$ is NP-complete. Show that $3SAT$ is also NP-complete.

◎請用深黑色鋼筆或原子筆出題

命題老師簽名：

科目：計算理論 B

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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. (10%) Prove or disprove that the class of regular languages is closed under the operation of intersection.
2. (10%) Prove or disprove that A and B are both regular languages if $A \cap B$ is a regular language.
3. (10%) Prove or disprove that the class of context-free languages is closed under the operation of union.
4. (10%) Prove or disprove that $L = \{ a^i b^i c^j \mid i, j \geq 0 \}$ is context-free.
5. (10%) Prove or disprove that A and B are both context-free languages if $A \cup B$ is a context-free language.

◎請用深黑色鋼筆或原子筆出題

命題老師簽名：