

科目：計算理論 A

日期：109 年 7 月 14 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. (10%) Design a Turing machine to accept the language $L = \{10^n 1 : n \text{ is an odd integer}\}$.
2. (20%) Let $L = \{ \langle M \rangle : M \text{ is a Turing machine and } 111 \in L(M) \}$, where $\langle M \rangle$ is the standard binary encoding of Turing machine M .
 - (a) Show that L is recursively enumerable.
 - (b) Show that L is not recursive (or undecidable) by the reduction from the Halting problem.
3. (20%) The vertex covering problem is: given (G, k) , determine whether there is a set of k vertices that cover all edges in G , where $G = (V, E)$ is an undirected graph. That is, find a set $S \subseteq V$ with $|S| \leq k$ such that for every edge $(v_1, v_2) \in E$, either $v_1 \in S$ or $v_2 \in S$.
 - (a) Show that the vertex covering problem is in NP.
 - (b) Show that the vertex covering problem is NP-complete problem by the reduction from either SAT or 3SAT.

◎請用深黑色鋼筆或原子筆出題

命題老師簽名：