

國立交通大學試題紙

一百零三學年度第二次
博士班資格考

科目：計算理論 A

日期：104 年 7 月 29 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.

- I. (20%) The halting problem (HALT) is that given a Turing machine M and a string w , determine whether M on input w halts. Show that HALT is undecidable.
- II. (5%) What is the Church-Turing thesis?
- III. (25%) This problem is about the NP complexity class.
 - A. Give a formal definition for the class NP.
 - B. Give a formal definition for an NP-complete problem.
 - C. Give a formal definition for an NP-hard problem.
- D. The traveling salesman problem (TSP) is that, given a directed graph $G=(V, E)$ and a positive number k , determine whether there exists a path of visiting every node of G exactly once and of length less than or equal to k . Show that TSP is NP-complete.

◎ 請用深黑色鋼筆或原子筆出題

命題老師簽名：

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Let $\Sigma = \{0, 1\}$, $w \in \Sigma^*$, and w^R denote the reverse of w . Please prove or disprove the following statements:

1. (10%) The class of regular languages is closed under the operation of complement.
2. (10%) $L_2 = \{w \mid w \neq w^R\}$ is regular.
3. (10%) The class of context-free languages is closed under the operation of complement.
4. (10%) $L_4 = \{0^n 1^n \mid n \geq 0\}$ is context free.
5. (10%) $\overline{L_4}$ is context free.

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命題老師簽名：