

# 銘傳大學 99 學年度研究所碩士班招生考試

## 電腦與通訊工程學系碩士班

### 第二節

### 離散數學試題

(第 1 頁共 2 頁) (限用答案本作答)

可使用計算機  不可使用計算機

- (6%) Let  $p$  and  $q$  be two propositions. Suppose that  $p \rightarrow q$  is known to be false. Give the true values for
  - $p \vee q$
  - $q \rightarrow p$
- (10%) Express the negations of each of these statements.
  - $\forall x(x^2 > x)$
  - $\exists x(x^2 = 2)$
- (10%) Use mathematical induction to prove the inequality  $n < 2^n$  for all positive integers  $n$ .
- (10%) Given an indirect proof of the theorem "If  $3n + 2$  is odd, then  $n$  is odd."
- (10%) Show that  $f(x) = x^2 + 2x + 1$  is  $\Theta(x^2)$ .
- (10%) Let  $R$  be a relation from a set  $A$  to a set  $B$ . The inverse relation from  $B$  to  $A$ , denoted by  $R^{-1}$ , is the set of ordered pairs  $\{(b, a) | (a, b) \in R\}$ . The complementary relation  $\bar{R}$  is the set of ordered pairs  $\{(b, a) | (a, b) \notin R\}$ . Let  $R$  be the relation  $R = \{(a, b) | a < b\}$  on the set of integers. Find
  - $R^{-1}$ .
  - $\bar{R}$ .
- (10%) Draw the Hasse diagram representing the partial ordering  $\{(a, b) | a \text{ divides } b\}$  on  $\{1, 2, 3, 4, 6, 8, 12\}$ .

本試題兩面印刷

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## 電腦與通訊工程學系碩士班

### 第二節

### 離散數學試題

(第 2 頁共 2 頁) (限用答案本作答)

可使用計算機  不可使用計算機

8. The complete bipartite graph  $K_{m,n}$  is the graph that has its vertex set partitioned into two subsets of  $m$  and  $n$  vertices, respectively. There is an edge between two vertices if and only if one vertex is in the first subset and the other vertex is in the second subset. Answer the following questions about the graph  $K_{3,4}$ .
- a. (4%) How many vertices and how many edges are in this graph?
  - b. (5%) Is this graph planar? Justify your answer.
  - c. (5%) Does this graph have an Euler circuit? Give reasons for your answer.
9. An undirected graph is displayed in Figure 1.
- a. (5%) Use an adjacency matrix to represent this graph.
  - b. (5%) Use an incidence matrix to represent this graph.

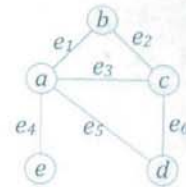


Figure 1

10. (10%) Find a recurrence relation for the number of bit strings (strings of 0's and 1's) of length  $n$  with an even number of 0s.

本試題兩面印刷

試題完