

淡江大學 99 學年度進修學士班轉學生招生考試試題

系別：資訊工程學系三年級

科目：離散數學

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1. Mark the statement T or F (是非題) (14 pts)

___(1). If $1+1 \neq 3$, then $1+1 > 3$.___(2). If $1+1 \neq 3$, then $1+1 < 3$.___(3). $\sum_{i=3}^5 \sum_{j=1}^2 (i+j) = \sum_{i=3}^5 i + \sum_{j=1}^2 j$ ___(4). For any set A, B, C , if $A \subseteq B \cup C$, then $A \subseteq B$ or $A \subseteq C$.**In the next 3 questions below suppose $A = \{x, y\}$ and $B = \{x, \{x\}\}$:**___(5). $x \subseteq B$.___(6). $\emptyset \in P(B)$. ($P(B)$ is the power set of B)___(7). $\{x\} \subseteq A - B$.2. In the questions below determine whether the rule describes a function. If not, give your reason. (回答是或不是，若不是則須解釋理由) (12 pts) (\mathbf{N} =set of natural number; \mathbf{Z} =set of integers; \mathbf{R} =set of real numbers)(a) $f: \mathbf{N} \rightarrow \mathbf{N}$ where $f(n) = \sqrt{n}$;(b) $F: \mathbf{Z} \rightarrow \mathbf{R}$ where $F(x) = \frac{1}{x^2 - 5}$ 3. Suppose $g: A \rightarrow B$ and $f: B \rightarrow C$ where $A = \{1, 2, 3, 4\}$, $B = \{a, b, c\}$, $C = \{2, 7, 10\}$, and f and g are defined by $g = \{(1, b), (2, a), (3, a), (4, b)\}$ and $f = \{(a, 10), (b, 7), (c, 2)\}$. Find $f \circ g$. (8 pts)4. If $A = \{1, 2, 3, 4, 5, 6\}$ and $B = \{x, y, z\}$, then Show enough work to get full credits. (16 pts)(a) How many functions are there from A to B ?(b) How many onto functions are there from A to B ?5. Consider the permutation on all the letters in the word *GOOGOL*: Show enough work to get full credits. (16 pts)

(a) How many different strings can be made?

(b) How many strings have to start with *O* or end with *O*?6. Find the value of $7 \ 2 \ 3 \ * \ - \ 4 \ \uparrow \ 9 \ 3 \ / \ +$ (in postfix expression).

Show enough work to get full credits. (10 pts)

7. Give a relation on $\{1, 2\}$ that is **symmetric** and **transitive**, but **not reflexive**. Justify your answer. (8 pts)8. Use **mathematical induction** to prove that $1 \cdot 2 + 2 \cdot 3 + \dots + n \cdot (n+1) = n(n+1)(n+2)/3$ for all $n \geq 1$. (16 pts)

(必須以歸納證明的方法證得)