

淡江大學九十二學年度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

准帶項目請打「○」否則打「×」	
	簡單型計算機

本試題共 1 頁

1. Let $A = \{1, 2, 3, 4, 5\} \times \{1, 2, 3, 4, 5\}$, and $x_1 + y_1 = x_2 + y_2$.

Now, the relation \mathcal{R} is defined on A as $(x_1, y_1) \mathcal{R} (x_2, y_2)$. Please

- (a) Prove that \mathcal{R} is an Equivalence Relation.
- (b) Partition A into Equivalence classes by \mathcal{R} .

2. Prove that for any $n \in \mathbb{Z}^+$, $n > 4$, $2^n > n^2$.

3. Suppose n balls are distributed into n boxes, so that all of the possible arrangements are equally likely. Please find

- (a) How many possible arrangements?
- (b) If only box 1 is empty, how many arrangements? (第一個盒子為空)
- (c) If exactly one box is empty, how many arrangements?
(只有一個盒子為空)

4. (a) Please find the recurrence relation and the initial condition of

$$\left\{ 5, \frac{10}{3}, \frac{20}{9}, \frac{40}{27}, \dots \right\}$$

(b) Please solve the recurrence relation

$$a_{n+2} = 2a_{n+1} + 3a_n, \quad n \geq 0, \quad a_0 = 1, \quad a_1 = 5.$$

5. From the following graph, please

- (a) Find the Hamilton cycle, if any.
- (b) Find the Hamilton path, if any.

