

科目：離散數學

適用：資工系三

考生注意：

1. 依次序作答，只要標明題號，不必抄題。
2. 答案必須寫在答案卷上，否則不予計分。
3. 限用藍、黑色筆作答；試題須隨卷繳回。

本 試 題

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編號：712

(以下各題均須寫出計算或證明過程方予計分)

1.
 - (a) In how many ways can the letters in UNUSUAL be arranged? (10%)
 - (b) For the arrangements in part (a), how many have all three U's together? (10%)
 - (c) How many of the arrangements in part (a) have no consecutive U's? (10%)
2. Let $n \in \mathbb{Z}^+$ with u the units digit of n . Prove that $7|n$ if and only if $7|[(n-u)/10 - 2u]$. (15%)
3. If $S \subseteq \mathbb{Z}^+$ and $|S| \geq 3$, prove that there exist distinct $x, y \in S$ where $x + y$ is even. (15%)
4. Let $A = \{1, 2, 3, 4, 5\} \times \{1, 2, 3, 4, 5\}$, and define \mathcal{R} on A by $(x_1, y_1) \mathcal{R} (x_2, y_2)$ if $x_1 + y_1 = x_2 + y_2$.
 - (a) Verify that \mathcal{R} is an equivalence relation on A . (10%)
 - (b) Determine the equivalence classes $[(1, 3)]$ and $[(2, 4)]$. (5%)
 - (c) Determine the partition of A induced by \mathcal{R} . (5%)
5. Determine the number of n -digit quaternary (0, 1, 2, 3) sequences in which there is never a 3 anywhere to the right of a 0. (20%)

試

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