國立成功大學

112學年度碩士班招生考試試題

編　號：176

系　所：電機工程學系

科　目：離散數學

日　期：0206

節　次：第 3 節

備　註：不可使用計算機

※ 考生請注意：本試題不可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分

1. (10%) Prove Let a, b ∈ Z. If a ≥ 2, then either a ∤ b or a ∤ (b + 1) (use contradiction to prove)

2. (10%) Use iteration to guess an explicit formula for the sequence. Simplify your answer whenever possible.
   $h_k = 2^k - h_{k-1}$, for all integers $k≥1$, $h_0=1$

3. (10%) For how many integers from 1 through 99,999 is the sum of their digits equal to 10?

4. (10%) What is the general form of the solutions of a linear homogeneous recurrence relation if its characteristic equation has roots 1, 1, 1, 1, -2, -2, -2, 3, 3, -4?

5. (10%) Determine an integer n such that n ≡ 1 (mod 7), n ≡ 3 (mod 8) and n ≡ 2 (mod 9)

6. (10%) Which amounts of postage can be formed using only 5-cent and 6-cent stamps? Formulate a conjecture and prove it.

7. (40%) Express the negations of each of these statements so that all negation symbols immediately precede predicates
   (a) (10%) ∀ x ∃ y ∀ z T(x, y, z)
   (b) (10%) ∀ x ∃ y P(x, y) ∨ ∀ x ∃ y Q(x, y)
   (c) (10%) ∀ x ∃ y (P(x, y) ∧ ∃ z R(x, y, z))
   (d) (10%) ∀ x ∃ y (P(x, y) → Q(x, y))