南華大學九十五學年度 碩士班 招生考試試題卷

系所別：資訊管理學系碩士班	科目編號：A2-24-22
科　目：離散數學	試題紙第 1 頁共 1 頁

1. 用歸納法證 Prove that for all n in N, $10^n \equiv (-1) \pmod{11}$, where "≡" means 同餘. For example, 13=2 mod 11　(10%)

2. Which of the following relations are equivalence relations? State your reasons. (10%)
   (a) "Having a common friend" for a class of students.
   (b) "Difference is odd" for a collection of numbers.

3. | A | =3, | B | =8: (10%)
   (a) How many functions are there from A to B?
   (b) How many 1-1 functions are there from A to B?
   (c) How many onto functions are there from A to B?

4. Suppose that a tree has ten vertices of degree 2, ten vertices of degree 3, ten vertices of degree 4, one vertices of degree 5, and its remaining vertices have degree 1. How many vertices does the tree have? (10%)

5. Given an infix form: (((A+B)*C+D)*E)-((A+B)*C+D). (10%)
   (a) Find a binary tree to the expression.
   (b) Find its prefix form and postfix form.

6. If n is a positive integer and n>1, and if nC_2 equals　n! / (2! * (n-2)!) prove that $nC_2 + (n-1)C_2$ is a perfect square, in other words, it is a square of one number(20%)

7. Suppose Z_{11} denote the set of integers, {0,1,2,3,..,10}. Find the multiplicative inverse of each element, except 0, in Z_{11} such that the remainder of ($a * (a^{-1})$) /11 =1. For example 2*6=12, 12/11=1, 6 is the inverse of 2 (10%)

8. 試排列 a,b,c,d 求出並解釋 $4P_2$ 與 $4C_2$ 之異同 (20%)