淡江大學 95 學年度轉學生招生考試試題

45-1

系別：資訊工程學系三年級　　科目：離 散 數 學

准帶項目請打「V」	
X	簡單型計算機

本試題共 1 頁

Be aware:1. Write the details to get full credits, except Problem 2. Answer alone will be half credited.

2. Answers can be in the form of n^k, n!, $\binom{n}{r}$, C_r^n, but **not in** H_r^n, or $\binom{-20}{8}$.

1. evaluate the sum of the following: (24 %)

(a) $\sum_{i=0}^{3}\sum_{j=0}^{2} ij$

(b) $\sum_{i=1}^{3}\sum_{j=0}^{2} i$

(c) $\bigcup_{i=1}^{n} Ai$ if $A_i=\{\ldots,-2,-1,0,1,2,\ldots, i\}$

(d) $1-\binom{101}{1}4+\binom{101}{2}4^2-\cdots-\binom{101}{99}4^{99}+\binom{101}{100}4^{100}-\binom{101}{101}4^{101}=$

2. Determine whether each of the following is true (**T**) or false (**F**) (25 pt)

____(a) If 2+2 = 4, then 1+1 = 3.

____(b) If God exists, then 1+1=3 or 2+2 = 4.

____(c) $\neg(p\rightarrow q) \Leftrightarrow p\wedge\neg q$.

____(d) For any set A, $|A-\phi| = |\phi - A|$. (ϕ = empty set)

____(e) For any set A, B, C, if $A\subseteq B\cup C$, then $A\subseteq B$ or $A\subseteq C$.

3. Prove that $1\cdot 1! + 2\cdot 2! + \ldots + n\cdot n! = (n+1)! - 1$, whenever n is a positive integer. (20 pts)

4. Write in details of the following questions: (10+15+6 pts)

(a) Give a formula for $|A\cup B\cup C|$, the number of elements in the union of three sets A, B, C.

(b) **Explain** how use the formula form (a) to find the number of nonnegative integer solutions to $x_1+x_2+x_3+x_4=22$ with $x_1<8$, $x_2<6$, and $x_3<5$? (You should find out the answer.)

(c) Write a generating function corresponding to the problem in (b) and indicate what the answer is, **do not evaluate it**.