逢甲大學104學年度碩士班考試入學試題

編號：043　科目代碼：319

科目	離散數學	適用系所	資訊工程學系	時間	100 分鐘

※請務必在答案卷作答區內作答。　　共 / 頁第　頁

1. Prove that n^4 is not $O(n^2)$. (10%)

2. Solve the system of congruence $x \equiv 1 \pmod 2$, $x \equiv 1 \pmod 3$, and $x \equiv 3 \pmod 5$. (15%)

3. Prove that $2n^2 - 20$ is nonnegative whenever n is an integer with n >= 4. (10%)

4. How many solutions are there to distribute seven distinguishable fruits into four indistinguishable baskets so that each of the baskets contains at least one fruit? (15%)

5. Find these values. (10%)
   (a) Find the values. $\left[\left\lceil \frac{5}{2} \right\rceil \bullet \left\lfloor \frac{15}{2} \right\rfloor + \frac{11}{10}\right]$
   (b) Determine the truth values for the compound proposition $(\neg p \leftrightarrow \neg q) \leftrightarrow (p \vee q)$.

6. Find these values. (12%)
   (a) What is the coefficient of $x^{11}y^{17}$ in the expansion of $(-2x-3y)^{28}$?.
   (b) Find the values of the extended binomial coefficients $\binom{-6}{3}$ and $\binom{11/2}{4}$
   (c) Find the general form of the solutions of the recurrence relation $a_k = 8a_{k-2} - 16a_{k-4}$.

7. How many solutions are there to the equation $x_1 + x_2 + x_3 + x_4 + x_5 = 21$ where $x_i, i = 1,2,3,4,5$ is a nonnegative integers such that
   (a) $x_1 \geq 1$　(b) $x_i \geq 2$　(c) $0 \leq x_1 \leq 10$　(20%)

8. Prove that $\sum_{k=0}^{n} (-1)^k \binom{n}{k} = 0$. (8%)