元智大學 102 學年度研究所 **碩士班** 招生試題卷

系(所)別：**生物與醫學資訊碩士學位學程** 組別：**不分組** 科目：**離散數學** 用紙第 / 頁共 / 頁

●不可使用電子計算機

請詳細敘述計算過程

1. <20pt> Determine whether each of these functions from {a,b,c,d} to itself is one-to-one or onto. *(每小題5分)*
   A. f(a)=d, f(b)=a, f(c)=c, f(d)=b
   B. f(a)=b, f(a)=b, f(c)=d, f(d)=c
   C. f(a)=d, f(b)=b, f(c)=c, f(d)=a
   D. f(a)=a, f(b)=b, f(c)=d, f(d)=d

2. <20pt> Find the two smallest positive solutions to the system of congruencies $x = 1 \bmod 3$, and $x = 3 \bmod 5$, and $x = 2 \bmod 7$.

3. <20pt> Use mathematical induction to show that

$$\sum_{k=1}^{n} k^2 = n(n+1)(2n+1)/6$$

4. <20pt> Determine the number of integer solutions of $x_1+ x_2+ x_3+ x_4=30$, where $x_1>2$, $x_2>0$, $x_3>1$, $x_4>=1$.

5. <20pt>How large a problem can be solved in 1000 second using an algorithm that requires f(n) bit operations, where each bit operation is carried out in 10^{-6} second, with these values for f(n)? (每小題4分)
   A. n
   B. n log n
   C. n^2
   D. 2^n
   E. n!

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