臺中健康暨管理學院

九十四學年度碩士班暨碩士在職專班招生考試試題紙

系　所　別	組 別	考試科目	考試日期	時　　間	備　　註
資訊學院碩士班	--	數學 A	94.4.24	13:30-15:10	共一頁

1. What is the last digit in $(17)^{2005}$? (10%)
2. How many positive integers n less than 7200 satisfy gcd(n, 7200)=1, where gcd(x,y) denotes the greatest common divisor of x and y. (10%)
3. How many spanning trees does the complete bipartite $K_{2,9}$ have? (10%)
4. Given $f = \{(a,b),\ (b,a),\ (c,b)\}$, a function from $X = \{a,\ b,\ c\}$ to X:

   Define $f^n = f \circ f \circ \ldots \circ f$ to be n-fold composition of f with itself.

   Find f^{911}. (10%)
5. Find the number of solutions in integers to $x_1 + x_2 + x_3 = 15$ satisfying

   $0 \le x_1 < 6$, $1 \le x_2 < 9$, $x_3 \ge 0$. (10%)
6. Solve the recurrence relation $a_n = -2n\, a_{n-1} + 3n(n-1)\, a_{n-2}$ with initial conditions $a_0 = 1$, $a_1 = 2$. (10%)
7. A connected, planar graph has nine vertices having degrees 2, 2, 2, 3, 3, 3 , 4, 4, and 5. How many edges are there? How many faces are there? (10%)
8. Solve the pair of equations

   x $\equiv$1 (mod 7) and x $\equiv$4 (mod 11). (10%)
9. Compute the complete solution of the system

   Ax=b with $A = \begin{bmatrix} 4 & 1 & 5 & 1 \\ 2 & 1 & 1 & -1 \\ 0 & 1 & -3 & -3 \end{bmatrix}$ and $b = \begin{pmatrix} 3 \\ 3 \\ 3 \end{pmatrix}$

   What is the rank and the dimension of the nullspace of this matrix? (10%)
10. Compute the inverse of the matrix $\begin{bmatrix} 1 & 2 & 3 \\ -1 & 2 & 1 \\ 3 & 1 & 2 \end{bmatrix}$. (10%)