臺中健康暨管理學院
九十三學年度碩士班招生考試試題紙

系 所 別	組 別	考試科目	考試日期	時 間	備 註
多媒體遊戲設計研究所碩士班	--	工程數學	93.5.3	10:30-12:10	共一頁

1. Find the general solution of the following equations.
   (a) $y' = 3(y+1)$ (8%)
   (b) $x^2 y' = y^2 + xy + x^2$ (8%)

2. Solve the initial value problem
   $y'' - y' - 6y = 0,$ $y(0) = 5,$ $y'(0) = -5.$ (10%)

3. (a) Find the Laplace transform of the function
   $$f(t) = \frac{b}{a}t \qquad \text{if } 0 < t < a,$$
   $$f(t+a) = f(t) \ . \quad (10\%)$$
   (b) Find the inverse Laplace transform f(t) of
   $$F(s) = \frac{s}{(s+3)^2 + 1}. \quad (10\%)$$

4. What is a symmetric matrix? Orthogonal matrix? Give an example for each case.   (10%)

5. Find the rank of the matrix $\begin{bmatrix} 3 & 1 & 4 \\ 0 & 5 & 8 \\ -3 & 4 & 4 \\ 1 & 2 & 4 \end{bmatrix}$.   (10%)

6. For the matrix $\begin{bmatrix} -5 & 2 \\ -9 & 6 \end{bmatrix}$ (14%)
   (a) Find the eigenvalues and eigenvectors.
   (b) Diagonalize the matrix.

7. Three boxes contain five balls each, numbered from 1 to 5, and one ball is drawn from each box. Find the possibility of the event E that the sum of the numbers on the drawn balls is greater than 4. (10%)

8. Let X have the density f(x) = 2x if $0 \leq x \leq 1$ and 0 otherwise. Show that X has the mean $\frac{2}{3}$ and the variance $\frac{1}{18}$.   (10%)