淡江大學九十四學年度碩士班招生考試試題 88-1

系別：電機工程學系　　科目：工 程 數 學

准帶項目請打「V」	
X	簡單型計算機

本試題共 1 頁

一、 Solve $(y'+y)^2 = e^x$; $y(0) = 0$. (20%) $\left(y' \triangleq \frac{dy}{dx}\right)$

二、 Solve $f(t) = 6t^2 + \int_0^t f(t-\tau)e^{-\tau}\,d\tau$ for $f(t)$, $t \geq 0$. (20%)

三、 Let $A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 1 & 3 \\ 1 & 0 & 2 \end{bmatrix}$.

(1) Find all the eigenvalues of A. (10%)

(2) Find the rank of the augmented matrix $\begin{bmatrix} A & A^{10} \\ A^{10} & A^{10} \end{bmatrix}$ (10%)

四、 Find the tangent plane to the surface $\sin(x^2+y^2) = z$ at the point $(1, 1, \sin(2))$. (20%)

五、 Let $f(t) = \begin{cases} 2 & \text{if } -1 \leq t \leq 1 \\ 0 & \text{otherwise} \end{cases}$. Find the Fourier transform of the following functions.

(1) $f(t)\cos(10t)$. (10%)

(2) $f(t)\cos^2(10t)$. (10%)