淡江大學九十三學年度碩士班招生考試試題

系別：土木工程學系　　科目：工 程 數 學

准帶項目請打「○」否則打「x」
簡單型計算機
○

本試題共 / 頁

1. Use "Integrating Factor" to solve the first-order differential equation $(x e^x + x^2 e^y) y' = -xy e^x - x e^y$ (25%)

2. Solve the initial value problem: $x^3 y''' - 3x^2 y'' + 6xy' - 6y = 2x^6$,
$y(1) = 0, y'(1) = 1, y''(1) = -1$ (25%)

3. Use Laplace Transform to solve the initial value problem:
$y'' + 10y' + 25y = e^{-5t} + 2\delta(t-1)$, $y(0) = 1, y'(0) = 0$ (25%)

4. (a) Find the eigenvalues and eigenvectors of the matrix $\mathbf{A} = \begin{bmatrix} 1 & 3 \\ 3 & -2 \end{bmatrix}$. (10%)

(b) Please explain the meanings of "**A is Positive-Definite**" and "**A is Negative-Definite**". (5%)

(c) Find the diagonal matrix $\hat{\mathbf{A}}$ which is "**similar**" to **A**. (10%)