淡江大學九十四學年度轉學生招生考試試題

系別： 工組三年級　　　　科目：工 程 數 學

1. Find the integration factor and solve the equation

$$(x e^x + x^2 e^y) dy + (xy e^x + x e^y) dx = 0 \qquad (20\%)$$

2. Solve the initial value problems:

$$y'' + 4y' + 6y = x^2 + \cos x, \quad y(0) = 0, y'(0) = 0 \qquad (20\%)$$

3. Use the "Laplace Transform" to solve the initial value problems:
$$y'' + 6y' + 9y = e^{-5x} + 2e^{-3x}, \quad y(0) = 1, y'(0) = 0 \quad (20\%)$$

4. Given $\mathbf{A} = \begin{bmatrix} -4 & 3 & 8 \\ -10 & -3 & -25 \\ 6 & -1 & 3 \\ 22 & 1 & 31 \end{bmatrix}$; Find the rank of $\mathbf{A}$ by using Gauss

Elimination Method. (20%)

5. Find the eigenvalues and eigenvectors of the matrix $\mathbf{A} = \begin{bmatrix} 1 & 3 \\ 3 & -2 \end{bmatrix}$. (20%)