

# 淡江大學 101 學年度碩士班招生考試試題

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系別：水資源及環境工程學系

科目：工程數學

考試日期：2月26日(星期日) 第3節

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1. Find the general solution of the equation (20%)

$$\frac{dy}{dx} + y = e^{3x}$$

2. Solve the equation (20%)

$$x^2 y'' + 5xy' + 4y = 0$$

3. Use the Laplace transform to solve the initial-value problem (20%)

$$y'' - y' = e^t \cos t \quad y(0) = 0, \quad y'(0) = 0$$

4. Find the eigenvalues and eigenvectors of the matrix (20%)

$$\begin{pmatrix} 5 & -1 & 0 \\ 0 & -5 & 9 \\ 5 & -1 & 0 \end{pmatrix}$$

5. Use Green's theorem to evaluate the line integral (20%)

$$\oint_C xy dx + x^2 dy$$

where C is the boundary of the region determined by the graphs of

$$x = 0, \quad x^2 + y^2 = 1, \quad x \geq 0$$