

# 淡江大學 106 學年度碩士班招生考試試題

16-1

系別：電機工程學系 3 組聯招

科目：工程數學

考試日期：3 月 4 日(星期六) 第 1 節

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1. (20%) Find the general solution.

$$xy' + 4y = 8x^4 \quad y(1) = 2$$

2. (20%) Solve the following Initial value problem

$$y''(x) + y'(x) - 2y(x) = 0 \quad y(0) = 4, y'(0) = -5$$

3. (20%) Find the eigenvalues and eigenvectors of

$$A = \begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$$

4. (20%) Find the Fourier coefficients of the periodic  $f(x)$ .

$$f(x) = \begin{cases} -k & \text{if } -\pi < x < 0 \\ k & \text{if } 0 < x < \pi \end{cases} \quad \text{and} \quad f(x+2\pi) = f(x).$$

5. (20%) Integrate

$$g(z) = \frac{z^2 + 1}{z^2 - \frac{1}{4}}$$

Counterclockwise around the circle of radius 1 with center (0, 0).