

淡江大學 106 學年度日間部寒假轉學生招生考試試題

31-1

系別：工學院三年級

科目：工程數學

考試日期：1月6日(星期六) 第2節

本試題共 6 大題，1 頁

1. (15%) Solve the initial value problem as follows.

$$\frac{dy}{dx} = y - y^2; \quad y(0) = 0.25$$

2. (20%) Find the solution for the second order ODE:

$$y'' + 2y' + 2y = 0; \quad y(0) = 0, \quad y'(0) = 15$$

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

$$\begin{bmatrix} 4 & 2 & -2 \\ 2 & 5 & 0 \\ -2 & 0 & 3 \end{bmatrix}$$

4. (20%) Find the Fourier series of the function with the definition as

follows:
$$f(x) = \begin{cases} x & \text{if } -\pi < x < 0 \\ \pi - x & \text{if } 0 < x < \pi \end{cases}$$

5. (10%) Find the inverse Laplace transform with the following function

$$\frac{3s}{s^2 - 2s + 2}$$

6. (15%) Let $u(x,t) = e^{-9t} \sin \omega x$: (a) verify the $u(x,t)$ is the solution of

$$\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}; \quad \text{(b) find the suitable } c$$