

淡江大學 105 學年度日間部寒假轉學生招生考試試題

系別：機電系、化材系、航太系三年級 科目：工程數學

39-1

考試日期：12月3日(星期六) 第3節

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1. Consider the following ordinary differential equation of initial value problem,

$$y'' + 3y' + 2y = e^{-x}$$

where y is differentiated with respect to x . Let $y(0) = 0$ and $y'(0) = 0$, please answer the following questions:

- (a) (20 %) Please solve this problem by assuming $y = e^{\lambda x}$ along with the method of undetermined coefficients.
- (b) (20 %) Please solve this problem by Laplace Transform.

2. Consider the following ordinary differential equation of initial value problem,

$$\dot{\mathbf{x}} = \mathbf{A}\mathbf{x}$$

where $\mathbf{x} = [x_1 \ x_2]^T$ and

$$\mathbf{A} = \begin{bmatrix} 0 & 1 \\ -5 & -6 \end{bmatrix}$$

with initial conditions $x_1(0) = 1$ and $x_2(0) = 2$.

- (a) (20 %) Please find the eigenvalues and the corresponding eigenvectors of matrix \mathbf{A} . Remember to represent the eigenvectors as unit vectors.
- (b) (20 %) Please solve this ODE problem.

3. (20 %) Find the Fourier series of the function

$$f(x) = e^x \text{ for } -\pi < x < \pi$$