

淡江大學 108 學年度日間部轉學生招生考試試題

系別：工學院三年級

科目：工程數學

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考試日期：7月24日(星期三) 第2節

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

$$\frac{dy}{dx} + 4xy = e^{-2x^2}; \quad y(0) = -4.3$$

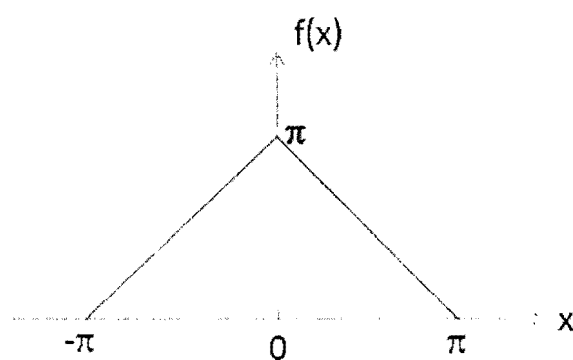
2. (15%) Find the solution for the second order ODE:

$$y'' + 4y = 8x^2; \quad y(0) = -3, \quad y'(0) = 0$$

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

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

4. (20%) Find the Fourier series of the given function $f(x)$ with the



definition as shown in the plot:

5. (20%) Solve the initial value problem (IVP) by the Laplace transform.

$$y'' + 7y' + 12y = 21e^{3t}; \quad y(0) = 3.5, \quad y'(0) = -10$$

6. (10%) Let $u(x, t) = e^{-\omega^2 c^2 t} \cos \omega x$: (a) verify the $u(x, t)$ is the solution of $\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}$; (b) find the suitable c