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科目：工程數學(L)
節次： 1

國立臺灣大學 106 學年度碩士班招生考試試題

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題一：(25%)

For the continuous-time periodic signal

$$x(t) = 2 + \cos(\frac{2\pi}{3}t) + 4\sin(\frac{5\pi}{3}t),$$

determine the fundamental frequency ω_0 and the Fourier series coefficients a_k such that

$$x(t) = \sum_{k=-\infty}^{\infty} a_k e^{jk\omega_0 t}.$$

題二：(25%)

Determine Fourier transform of $x(t)$

$$x(t) = \begin{cases} 1 + \cos\pi t, & |t| \le 1 \\ 0, & |t| > 1 \end{cases}$$

題三：(25%)

$$A = \begin{bmatrix} \frac{3}{4} & \frac{1}{4} & 0 \\ \frac{1}{4} & \frac{3}{4} & 0 \\ -\frac{1}{4} & -\frac{1}{4} & \frac{1}{2} \end{bmatrix} \quad \text{Please find } \lim_{n \to \infty} A^n = ?$$

題四：(25%)

Find the general solution to the following O.D.E.

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

試題隨卷繳回