

淡江大學 105 學年度日間部寒假轉學生招生考試試題

系別：土木系工程設施組三年級

科目：工程數學

30-1

考試日期：12月3日(星期六) 第2節

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1. (20%) Please find the general solution for the first-order ODE:

$$\frac{dy}{dx} = \frac{y}{4x} - \frac{x}{4y}$$

2. (25%) Please find the general solution for the first-order ODE:

$$y' - \frac{2y}{x} = x^2 \sin(4x)$$

3. Consider that $L\{f(t)\} = F(s)$, which is the Laplace transform of the function $f(t)$. Please determine

(1) (15%) $\int_0^{\infty} (t^4 + e^{2t} + 5)e^{-st} dt$

(2) (15%) $L\left\{ \frac{1}{n!} e^t \frac{d^n}{dt^n} (t^n e^{-t}) \right\}$

4. (25%) Find the Fourier series of the periodic function with the following definition:

$$f(t) = \begin{cases} 1, & 0 < t < \pi \\ -1, & -\pi < t < 0 \end{cases}$$