

國立中央大學 105 學年度碩士班考試入學試題

所別： 企業管理學系 碩士班 一般甲組(一般生)

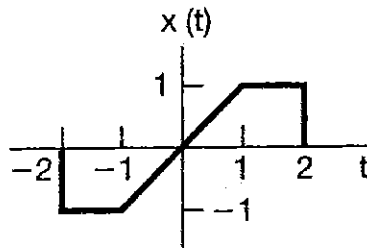
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科目： 工程數學

本科考試禁用計算器

*請在答案卷(卡)內作答

1. Compute the Fourier transform of $x(t)$ as shown in the following figure. (20%)



2. Prove the Fourier transform of $x(t) = \frac{t^{n-1}}{(n-1)!} e^{-at} u(t)$, $a > 0$ is $\frac{1}{(a+j\omega)^n}$. (20%)

3. Evaluate the integral $\int_{-5}^5 u_1(1-\tau) \cos(2\pi\tau) d\tau$. (20%)

4. For a function $g(t) = x(t) + \alpha x(-t)$, where $x(t) = \beta e^{-t} u(t)$ and the Laplace transform of $g(t)$ is

$$G(s) = \frac{s}{s^2 - 1}, \quad -1 < \Re\{s\} < 1$$

Find the values of α and β . (20%)

5. Solve the following homogeneous differential equations with the specified conditions. (20%)

$$\frac{d^2 y(t)}{dt^2} + 2 \frac{dy(t)}{dt} + 5y(t) = 0, \quad y(0) = 1, \quad y'(0) = 1$$

