

國立中央大學97學年度碩士班考試入學試題卷

所別：企業管理學系碩士班 一般類組(乙組) 科目：工程數學 共一頁 第一頁

*請在試卷答案卷(卡)內作答

1. Find a second-order homogeneous linear differential equation for which $x^4 \cos(\ln x^2)$ and $x^4 \sin(\ln x^2)$ are solutions. (10 pts.)

2. Please solve $\frac{dy}{dx} = \frac{1+y^2}{y+x^2y}$ (10 pts.)

3. Find the inverse Laplace transform of $\frac{s+3}{(s^2+6s+10)^2}$ (10 pts.)

4. Please calculate the Fourier Transform of

$$f(x) = \begin{cases} xe^{-x} & \text{if } x > 0 \\ 0 & \text{if } x < 0 \end{cases}$$

(10 pts.)

5. Please solve $xy'' = (y' - x)^2 + y'$ (12 pts.)

6. Please solve $\frac{dy}{dx} = \frac{\cos y + 2x^2}{x \sin y}$ (12 pts.)

7. Please solve the following Initial Value Problem:

$$y'' - 6y' + 9y = x^2 e^{3x}, y(0) = 2, y'(0) = 17$$

(12 pts.)

8. Please solve $x^2 y'' - 4xy' + 6y = x^4 \sin x$. (12 pts.)

9. Please solve the following nonhomogeneous linear system:

$$y_1' = -3y_1 - 4y_2 + 5e^x$$

$$y_2' = 5y_1 + 6y_2 - 6e^x$$

(12 pts.)

參考用