

國立中央大學99學年度碩士班考試入學試題卷

所別：企業管理學系碩士班 一般乙組(一般生) 科目：工程數學 共一頁 第一頁

本科考試禁用計算器

*請在試卷答案卷(卡)內作答

In this exam, x or t is the independent variable and y (or y_1, y_2) is the dependent variable, which we would like to know.

- (14 pts.) Please *derive* to obtain the answer of $y' + p(x)y = r(x)$ and then use it to solve $xy' - 2y = x^3 \cos 4x$
- (10 pts.) Please calculate the Fourier Transform of $e^{-|x+1|} + e^{-|x|}$
- (10 pts.) Please solve $y' = \frac{5x+4y}{2x-y}$
- (10 pts.) Please solve $x(y')^2 + 2xy' - y = 0$
- (10 pts.) Please use the Laplace transform to solve $ty'' + (1-2t)y' - 2y = 0$
- (12 pts.) Please solve $y''' - 6y'' + 12y' - 8y = \sqrt{x}e^{2x}$
- (12 pts.) Please use the method of power series to verify that the answer of $y'' - 4xy' + (4x^2 - 2)y = 0$ is $(a_0 + a_1x)e^{x^2}$
- (10 pts.) Please solve the following initial value problem of a nonhomogeneous linear system:
$$\begin{aligned} y_1' &= y_1 + 4y_2 - x^2 + 6x \\ y_2' &= y_1 + y_2 - x^2 + x - 1 \end{aligned} \quad y_1(0)=2, y_2(0)=-1$$
- (12 pts.) Please solve
$$y'' + 5y' + 6y = r(t), y(0) = y'(0) = 0, \quad r(t) = \begin{cases} 1, & \text{if } 1 < t < 2 \\ 0, & \text{otherwise} \end{cases}$$

參考用