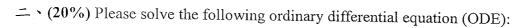
所別:企業管理學系碩士班 一般甲組(一般生) 科目:工程數學 共 / 頁 第 / 頁 本科考試禁用計算器

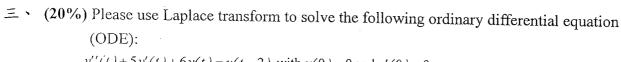
*請在試卷答案卷(卡)內作答

 $- \cdot (20\%)$ Please solve the following ordinary differential equation (ODE):

$$y'(x) = 3y(x)$$
, with $y(0) = 3$.



$$5x^2 - 3y^2 + 6xyy' = 0$$
, with $y(1) = 2$.



$$y''(t) + 5y'(t) + 6y(t) = u(t-2)$$
, with $y(0) = 0$ and $y'(0) = 0$.

u \sim (20%) Please find the inverse Fourier transform of the following time domain signals:

$$(-) (10\%) X(j\omega) = \frac{3j\omega + 24}{(j\omega)^2 + 5j\omega + 4}$$
.

$$(-1)(10\%)$$
 $X(j\omega) = \begin{cases} 1, -10 < \omega < 10 \\ 0, \text{ otherwise} \end{cases}$

 \mathcal{L} \((20%) Please prove the following relations:

$$(-) (10\%) F\{x(t) * g(t)\} = X(j\omega) \cdot G(j\omega)$$

where $F\{\cdot\}$ is the Fourier transform operator, * is the continuous-time convolution operator, and $X(j\omega)$ and $G(j\omega)$ are the Fourier transforms of x(t) and g(t), respectively.

$$(\underline{\hspace{0.5cm}}) (10\%) L\{f(t)^* g(t)\} = L\{g(t)^* f(t)\},$$

where $L\{\cdot\}$ is the Laplace transform operator, * is the continuous-time convolution operator, and f(t) and g(t) are two continuous-time signals.



