

Let $y' = d/dx$, $y'' = d^2/dx^2$. Find the solution of the ordinary differential equation $y'' + 5y' + 6y = 0$, $y(0) = 1$, $y'(0) = 2$. [102 台大應力乙 2(a)]

[解] 特徵方程式 $\lambda^2 + 5\lambda + 6 = 0 \Rightarrow \lambda = -2, -3$

$$y(x) = C_1 e^{-2x} + C_2 e^{-3x} \Rightarrow y'(x) = -2C_1 e^{-2x} - 3C_2 e^{-3x}$$

$$y(0) = 1 \Rightarrow C_1 + C_2 = 1$$

$$y'(0) = 2 \Rightarrow -2C_1 - 3C_2 = 2 \cdots \cdots \cdots (i)$$

解得 $C_1 = 5$, $C_2 = -4$

$$\therefore y = 5e^{-2x} - 4e^{-3x}$$



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