$$\begin{cases} \ddot{x} + 5\dot{x} + 4x = 0 \implies \ddot{x} = -5\dot{x} - 4x \\ x \stackrel{\Delta}{=} y_1 \rightsquigarrow \dot{x} = \dot{y}_1 = y_2 \\ \dot{x} \stackrel{\Delta}{=} y_2 \xrightarrow{\text{d/dt}} \ddot{x} = \dot{y}_2 \end{cases} \implies \dot{y}_2 = 5y_2 - 4y_1 \implies$$

$$\begin{pmatrix} \dot{y}_1 \\ \dot{y}_2 \end{pmatrix} = \begin{pmatrix} 0 & 1 \\ -4 & -5 \end{pmatrix} \begin{pmatrix} y_1 \\ y_2 \end{pmatrix}$$

$$\begin{pmatrix} y_1 \\ y_2 \end{pmatrix} = \begin{pmatrix} 0 \\ 3 \end{pmatrix}$$

$$\searrow \lambda^2 + 5\lambda + 4 = 0 \implies (D+1)(D+4)$$

$$\ker[(D+1)(D+4)] = \{ e^{-t}, e^{-4t} \}$$

c.i.

$$x(t) = Ae^{-t} + Be^{-4t} \implies \boxed{x(0) = A + B = 0}$$

$$\dot{x}(t) = -Ae^{-t} - 4Be^{-4t} \implies \dot{x}(0) = -A - 4B = -A + 4A = 3 \quad A = 3$$

$$\boxed{\begin{array}{l} A = 1 \\ B = -1 \end{array}}$$

$$x(t) = e^{-t} - e^{-4t}$$

$$x(0) = 0$$

$$\dot{x}(0) = 3$$