$x_1(t)$ $\quad \dfrac{dx_1}{dt} = 3x_1 + 4x_2 + e^{3t} + 4t^2 \qquad x_1(0) = 5$

$x_2(t)$ $\quad \dfrac{dx_2}{dt} = 2x_1 + 5x_2 + 6t + 8 \qquad x_2(0) = -6$

$$S(2)\ EDO(1)\ L\ CC\ \text{NH}$$

$$\frac{d}{dt}\begin{bmatrix} x_1(t) \\ x_2(t) \end{bmatrix} = \begin{bmatrix} 3 & 4 \\ 2 & 5 \end{bmatrix}\begin{bmatrix} x_1(t) \\ x_2(t) \end{bmatrix} + \begin{bmatrix} e^{3t} + 4t^2 \\ 6t + 8 \end{bmatrix} \qquad \bar{x}(0) = \begin{bmatrix} 5 \\ -6 \end{bmatrix}$$

$$\frac{d}{dt}\bar{x}(t) = A\,\bar{x}(t) + \bar{b}(t)$$

$$\frac{d}{dt}\bar{x}(t) = A\bar{x}(t) + \bar{b}(t)$$

$$\bar{x}(t) = \left[e^{At}\right]\bar{x}(0) + \int_0^t \left[e^{A(t-\tau)}\right]\bar{b}(\tau)\,d\tau$$

$$\left[\int_0^t \left[e^{A(t-\tau)}\right]\bar{b}(\tau)\,d\tau\right]_{t=0} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

$$x_1(t) \quad \frac{dx_1}{dt} = 3x_1 + 4x_2 + e^{3t} + 4t^2 \qquad x_1(0) = 5$$

$$x_2(t) \quad \frac{dx_2}{dt} = 2x_1 + 5x_2 + 6t + 8 \qquad x_2(0) = -6$$

$$x_2 = \frac{1}{4}\left(\frac{dx_1}{dt} - 3x_1 - e^{3t} - 4t^2\right)$$

$$x_2 = \frac{1}{4}\frac{dx_1}{dt} - \frac{3}{4}x_1 - \frac{1}{4}e^{3t} - t^2$$

$$\frac{dx_2}{dt} = \frac{1}{4}\frac{d^2x_1}{dt^2} - \frac{3}{4}\frac{dx_1}{dt} - \frac{3}{4}e^{3t} - 2t$$

$$\frac{1}{4}\frac{d^2x_1}{dt^2} - \frac{3}{4}\frac{dx_1}{dt} - \frac{3}{4}e^{3t} - 2t =$$

$$\frac{2x_1 + 5\left(\frac{1}{4}\frac{dx_1}{dt} - \frac{3}{4}x_1 - \frac{1}{4}e^{3t} - t^2\right) + 6t + 8}{}$$

$$\frac{d^2x_1}{dt^2} - 3\frac{dx_1}{dt} - 3e^{3t} - 8t = 8x_1 + 5\frac{dx_1}{dt} - 15x_1 - 5e^{3t} - 20t^2 + 24t + 32$$

$$\frac{d^2x_1}{dt^2} - 8\frac{dx_1}{dt} + 7x_1 = -2e^{t} + 32t - 20t^2 + 32$$

$x_1 =$ $\qquad\qquad$ $x_2 =$