TEMA 3b. SIST. EC. DIF. LIN. NO HOM

$$\left.\begin{aligned}\frac{dx_1}{dt} &= x_1 + 2x_2 + 5e^{4t} + t^2 \\ \frac{dx_2}{dt} &= 2x_1 + 3x_2 + 6t + \cos(2t)\end{aligned}\right| \begin{aligned} x_1(0) &= 5 \\ x_2(0) &= -4\end{aligned}$$

$$\frac{d}{dt}\begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} \frac{dx_1}{dt} \\ \frac{dx_2}{dt} \end{bmatrix} \qquad \bar{X} = \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} \qquad \bar{B}(t) = \begin{bmatrix} 5e^{4t} + t^2 \\ 6t + \cos(2t) \end{bmatrix}$$

$$\bar{X}(0) = \begin{bmatrix} 5 \\ -4 \end{bmatrix} \qquad \left[e^{At} \right] \qquad A = \begin{bmatrix} 1 & 2 \\ 2 & 3 \end{bmatrix}$$

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

Prod Tau

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

$$e^{At}$$

$$\frac{d}{dt}e^{At} = A \times e^{At}$$

$$e^{At}\Big]_{t=0} = I$$

$$\frac{d}{dt}e^{At} - A \times e^{At} = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$$

$$\left[e^{At}\right]^{-1} = \left[e^{At}\right]_{t=-t}$$