RECORDATORIO:

ENVIAR LAS DOS TAREAS AL NUEVO CORREO QUE ESTÁ EN LA PÁGINA.

SISTEMA DE EDO.

$$\begin{bmatrix} x_1(t) \\ x_2(t) \\ \vdots \\ x_n(t) \end{bmatrix} \qquad \begin{aligned} \frac{dx_1}{dt} &= a_{11}x_1 + a_{12}x_2 + \dots + a_{1n}x_n \\ \frac{dx_2}{dt} &= a_{21}x_1 + a_{22}x_2 + \dots + a_{2n}x_n \\ \frac{dx_3}{dt} &= a_{31}x_1 + a_{32}x_2 + a_{33}x_3 + \dots + a_{3n}x_n \\ &\vdots \\ \frac{dx_n}{dt} &= a_{n1}x_1 + a_{n2}x_2 + \dots + a_{nn}x_n \end{aligned}$$

$$\frac{d}{dt}\begin{bmatrix} x_1(t) \\ x_2(t) \\ \vdots \\ x_n(t) \end{bmatrix} = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & & \vdots \\ a_{n1} & a_{n2} & \cdots & a_{nn} \end{bmatrix} \begin{bmatrix} x_1(t) \\ x_2(t) \\ \vdots \\ x_n(t) \end{bmatrix}$$

$$\frac{d}{dt}\bar{X}(t) = A \times \bar{X}(t)$$

$$\bar{X}(t) = \left[e^{At}\right]\bar{X}(0) \qquad \frac{d}{dt}e^{At} = Ae^{At}$$

$$\frac{d}{dt}$$

$$\frac{d}{dt}\bar{X}(t) = Ae^{At}\bar{X}(0)$$

$$Ae^{At}\bar{X}(0) = A\left(e^{At}\right)\bar{X}(0)$$

$$\frac{d^4y(t)}{dt^4}+8\frac{d^3y(t)}{dt^3}-6\frac{d^2y(t)}{dt^2}+4\frac{dy(t)}{dt}-2y(t)=0$$

EDO(4) L cc H.

$$y(t) \Rightarrow y_1(t)$$

$$\frac{dy(t)}{dt} \Rightarrow \frac{dy_1(t)}{dt}=y_2(t)$$

$$\frac{d^2y(t)}{dt^2} \Rightarrow \frac{dy_2(t)}{dt}=y_3(t)$$

$$\frac{d^3y(t)}{dt^3} \Rightarrow \frac{dy_3(t)}{dt}=y_4(t)$$

$$\frac{d^4y(t)}{dt^4} \Rightarrow \frac{dy_4(t)}{dt}$$

$$\frac{dy_4(t)}{dt}+8y_4(t)-6y_3(t)+4y_2(t)-2y_1(t)=0$$

S(4) EDO(1) L cc H.

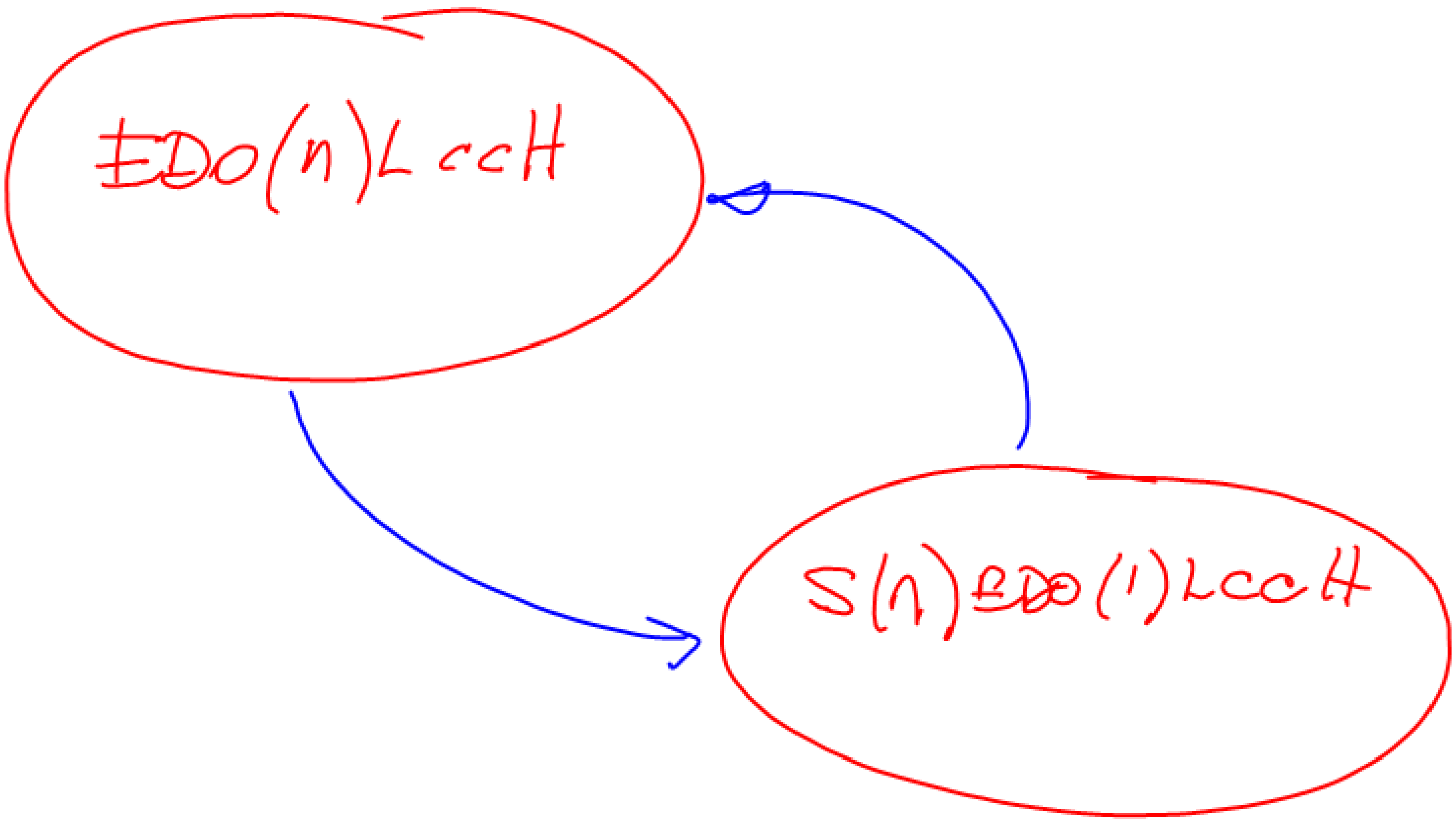
$$\frac{dy_1(t)}{dt}=y_2(t)$$

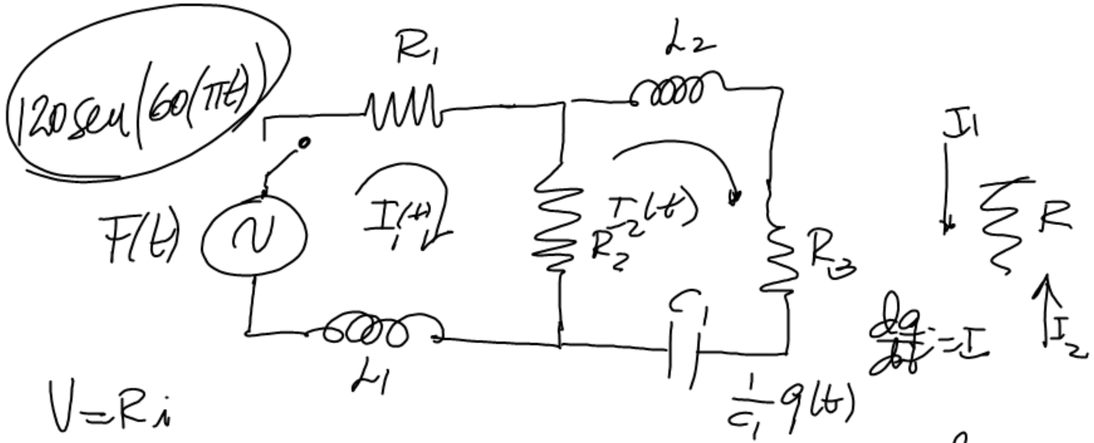
$$\frac{dy_2(t)}{dt}=y_3(t)$$

$$\frac{dy_3(t)}{dt}=y_4(t)$$

$$\frac{dy_4(t)}{dt}=2y_1(t)-4y_2(t)+6y_3(t)-8y_4(t)$$

$$\frac{d}{dt}\bar{y}=\begin{bmatrix}0&1&0&0\\0&0&1&0\\0&0&0&1\\2&-4&6&-8\end{bmatrix}\begin{bmatrix}y_1(t)\\y_2(t)\\y_3(t)\\y_4(t)\end{bmatrix}$$


EDO(n)LccH
S(n)EDO(1)LccH



$$V = R i$$

$$V = L \frac{di}{dt}$$

$$R_1 I_1(t) + (I_2(t) - I_1(t)) R_2 + L_1 \frac{dI_1(t)}{dt} = F(t)$$

$$R_3 I_2(t) + L_2 \frac{dI_2(t)}{dt} + (I_2(t) - I_1(t)) R_2 = 0$$

$$\left\{ \begin{array}{l} \dfrac{dI_1(t)}{dt} = \dfrac{(-R_1+R_2)}{L_1} I_1(t) - \dfrac{R_2}{L_1} I_2(t) + \dfrac{F(t)}{L_1} \\ \dfrac{dI_2(t)}{dt} = \dfrac{R_2}{L_2} I_1(t) + \left(\dfrac{-R_2-R_3}{L_2}\right) I_2(t) \end{array} \right\}$$

$$\frac{d}{dt}\begin{bmatrix} I_1(t) \\ I_2(t) \end{bmatrix} = \begin{bmatrix} \frac{-R_1+R_2}{L_1} & -\frac{R_2}{L_1} \\ \frac{R_2}{L_2} & -\frac{R_2-R_3}{L_2} \end{bmatrix} \begin{bmatrix} I_1(t) \\ I_2(t) \end{bmatrix} + \begin{bmatrix} \frac{F(t)}{L_1} \\ 0 \end{bmatrix}.$$

S(2) EDO(1) L cc NH.

$$A_{n\times n} \Rightarrow e^{At}$$

(propios)

buscar los valores característicos

$\underline{A}$

$$\lambda^{n} + a_1\lambda^{n-1} + a_2\lambda^{n-2} + \cdots + a_{n-1}\lambda + a_n = 0$$

$$\lambda_1 \quad \lambda_2 \quad \lambda_3 \cdots \lambda_n$$

$$\det(A - \lambda I) = 0$$

$A_{n\times n}$

$$e^{At} = \beta_0(t)I + \beta_1(t)A + \beta_2(t)A^2 + \dots + \beta_{n-1}(t)A^{n-1}$$

$$e^{\lambda_1 t} = \beta_0(t) + \beta_1(t)\lambda_1 + \beta_2(t)\lambda_1^2 + \dots + \beta_{n-1}(t)\lambda_1^{n-1}$$

$$e^{\lambda_2 t} = \beta_0(t) + \beta_1(t)\lambda_2 + \beta_2(t)\lambda_2^2 + \dots + \beta_{n-1}(t)\lambda_2^{n-1}$$

$$\vdots$$

$$e^{\lambda_n t} = \beta_0(t) + \beta_1(t)\lambda_n + \beta_2(t)\lambda_n^2 + \dots + \beta_{n-1}(t)\lambda_n^{n-1}$$

$$A=\begin{bmatrix}2 & 3\\ 1 & 4\end{bmatrix}$$

$$\det(A-\lambda I)=0$$

$$\begin{vmatrix}2-\lambda & 3\\ 1 & 4-\lambda\end{vmatrix}=0$$

$$(2-\lambda)(4-\lambda)-3=0$$

$$\lambda^2-6\lambda+5=0 \begin{cases}\lambda_1=1\\ \lambda_2=5\end{cases}$$

$$(\lambda-1)(\lambda-5)=0$$

2x2

$$\boxed{e^{At}=B_0(t)I+B_1(t)A} \qquad I=\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix} \quad A=\begin{bmatrix}2 & 3\\ 1 & 4\end{bmatrix}$$

$$e^{t}=B_0(t)+B_1(t)(1)$$

$$e^{5t}=B_0(t)+5B_1(t)$$

$$e^{5t}-e^{t}=4B_1(t) \qquad B_1(t)=\frac{1}{4}(e^{5t}-e^{t})$$

$$B_0(t)=e^{t}-B_1(t)$$

$$B_0(t)=e^{t}-\frac{1}{4}e^{5t}+\frac{1}{4}e^{t}$$

$$B_0(t)=\frac{5}{4}e^{t}-\frac{1}{4}e^{5t}$$

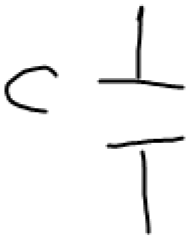
$$e^{At}=\left(\frac{5}{4}e^{t}-\frac{1}{4}e^{5t}\right)\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}+\left(-\frac{1}{4}e^{t}+\frac{1}{4}e^{5t}\right)\begin{bmatrix}2 & 3\\ 1 & 4\end{bmatrix}$$

$$e^{At}=\frac{1}{4}\begin{bmatrix}5-2 & -3\\ -1 & 5-4\end{bmatrix}e^{t}+\frac{1}{4}\begin{bmatrix}-1+2 & 3\\ 1 & -1+4\end{bmatrix}e^{5t}$$

$$\boxed{e^{At}=\frac{1}{4}\begin{bmatrix}3 & -3\\ -1 & 1\end{bmatrix}e^{t}+\frac{1}{4}\begin{bmatrix}1 & 3\\ 1 & 3\end{bmatrix}e^{5t}}$$

$Ri = V$

$L\frac{dI}{dt} = V$



$\frac{1}{c}q$

$\frac{dq}{dt} = I.$

$$\frac{dx}{dt} = 2x + 3y$$

$$\frac{dy}{dt} = x + 4y$$

$$\frac{d}{dt}\begin{bmatrix} x(t) \\ y(t) \end{bmatrix} = \begin{bmatrix} 2 & 3 \\ 1 & 4 \end{bmatrix}\begin{bmatrix} x(t) \\ y(t) \end{bmatrix}$$

$$e^{At} \longrightarrow A.$$

$$\frac{d}{dt}e^{At} \longrightarrow Ae^{At}\Big|_{t=0} = A \times I.$$