$$\frac{d^3y}{dt^3} + \frac{d^2y}{dt^2} + \frac{dy}{dt} + y = 2e^{2t}$$

$$y = y_1(t)$$

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

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

$$\frac{d^3y}{dt^3} \to \frac{dy_3(t)}{dt}$$

$$\boxed{\frac{dy_3(t)}{dt} + y_3(t) + y_2(t) + y_1(t) = 2e^{2t}}$$

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

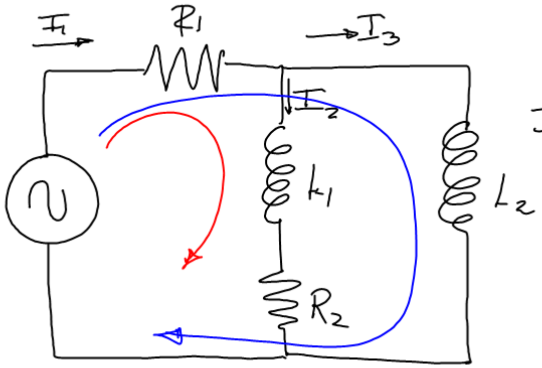
$$\frac{dy_2(t)}{dt} = y_3(t)$$

$$\frac{dy_3(t)}{dt} = -y_1(t) - y_2(t) - y_3(t) + 2e^{2t}$$

$$\frac{d}{dt}\begin{bmatrix} y_1(t) \\ y_2(t) \\ y_3(t) \end{bmatrix} = \underbrace{\begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -1 & -1 & -1 \end{bmatrix}}_{A} \begin{bmatrix} y_1(t) \\ y_2(t) \\ y_3(t) \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 2e^{2t} \end{bmatrix}$$

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

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



$$I_1(t) = I_2(t) + I_3(t)$$

$$E(t) = 110 \operatorname{sen}\left(60(2\pi t)\right)$$

$$R_1 I_1(t) + L_1 \frac{dI_2(t)}{dt} + R_2 I_2(t) = E(t)$$

$$R_1 I_1(t) + L_2 \frac{dI_3(t)}{dt} = E(t)$$

$$R_1\left(I_2(t) + I_3(t)\right) + L_1 \frac{dI_2(t)}{dt} + R_2 I_2(t) = E(t)$$

$$R_1\left(I_2(t) + I_3(t)\right) + L_2 \frac{dI_3(t)}{dt} = E(t)$$

$$L_1 \frac{dI_2(t)}{dt} = -(R_1 + R_2) I_2(t) - R_1 I_3(t) + E(t)$$

$$L_2 \frac{dI_3(t)}{dt} = -R_1 I_2(t) - R_1 I_3(t) + E(t)$$

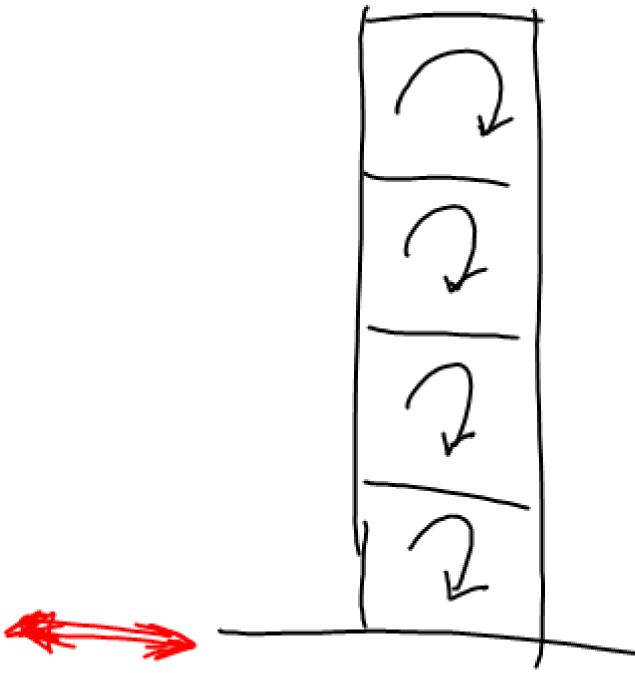
$$\frac{dI_2(t)}{dt} = -\frac{R_1 + R_2}{L_1} I_2(t) - \frac{R_1}{L_1} I_3(t) + \frac{1}{L_1} E(t)$$

$$\frac{dI_3(t)}{dt} = -\frac{R_1}{L_2} I_2(t) - \frac{R_1}{L_2} I_3(t) + \frac{1}{L_2} E(t)$$

$$\frac{d}{dt}\begin{bmatrix} I_2(t) \\ I_3(t) \end{bmatrix} = \begin{bmatrix} -\frac{R_1+R_2}{L_1} & -\frac{R_1}{L_1} \\ -\frac{R_1}{L_2} & -\frac{R_1}{L_2} \end{bmatrix} \begin{bmatrix} I_2(t) \\ I_3(t) \end{bmatrix} + \begin{bmatrix} \frac{1}{L_1} \\ \frac{1}{L_2} \end{bmatrix} E(t)$$

$I_2(0) = 0$

$I_3(0) = 0$



S(2) EDO(1) LccH.

S(2) EDO(1) LccH.

S(2) EDO(1) LccH.

S(2) EDO(1) LccNH.

S(8) EDO(1) LccNH.

Problema de Presa - Depredador

10 conejos
10 Lobos.

$$\frac{dL}{dt} = -0.16\,L + 0.08\,L \cdot C$$

$$\frac{dC}{dt} = 4.5\,C - 0.9\,L \cdot C$$