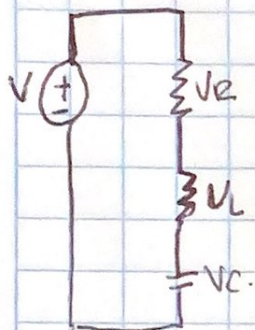


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## Ejercicio 1.



$$x = \begin{bmatrix} i(t) \\ V_c(t) \end{bmatrix}$$

$$y = V_L(t)$$

$$V_c = \frac{1}{C} \int i(t) dt$$

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

$$\text{KVL: } \sum V = 0$$

$$V - V_R - V_L - V_C = 0$$

$$V - R i(t) - L \frac{di}{dt} - V_C = 0$$

$$L \frac{di}{dt} + R i(t) + V_C = V$$

$$U = V$$

1) Variables de estado.

$$x = \begin{bmatrix} i(t) \\ V_c(t) \end{bmatrix} \quad \dot{x} = \begin{bmatrix} i(t) \\ V_c(t) \end{bmatrix} \quad \dot{x} = \begin{bmatrix} i(t) \\ \frac{1}{C} i(t) \end{bmatrix} \quad \begin{cases} \dot{x}_1 = \frac{1}{L} (V - V_C - R i) \\ \dot{x}_2 = \frac{1}{C} i(t) \end{cases}$$

$$y = V_L = L \frac{di}{dt} \Rightarrow V - V_C - R i$$

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} -R/L & -1/L \\ 1/C & 0 \end{bmatrix} \begin{bmatrix} i(t) \\ V_c(t) \end{bmatrix} + \begin{bmatrix} 1/L \\ 0 \end{bmatrix} V$$

2) Ecuaciones de salida

$$y = \begin{bmatrix} -R & -1 \end{bmatrix} \begin{bmatrix} i(t) \\ V_c(t) \end{bmatrix} + V$$