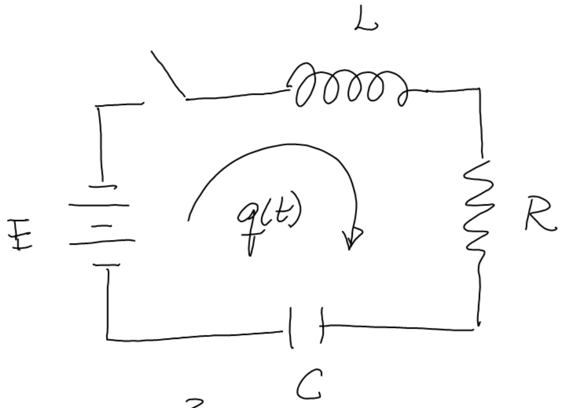


$q(t)$

$i(t) = \frac{dq}{dt}$

$$L\frac{d^2q}{dt^2} + R\frac{dq}{dt} + \frac{q}{C} = E \cdot u(t-a)$$

$$u(t-a) = \begin{cases} 0 \; ; \; t \leq a \\ 1 \; ; \; t > a \end{cases}$$

$L = 1$ Henry

$R = 20\ \Omega$

$C = 0.005$ faraday

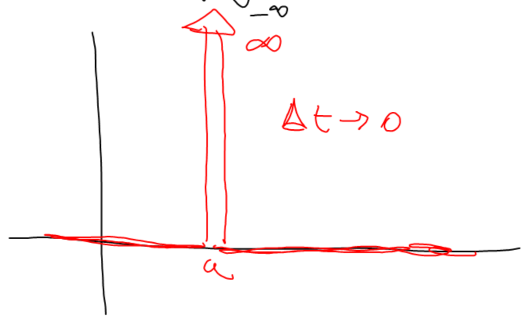
$E = 150$ V.

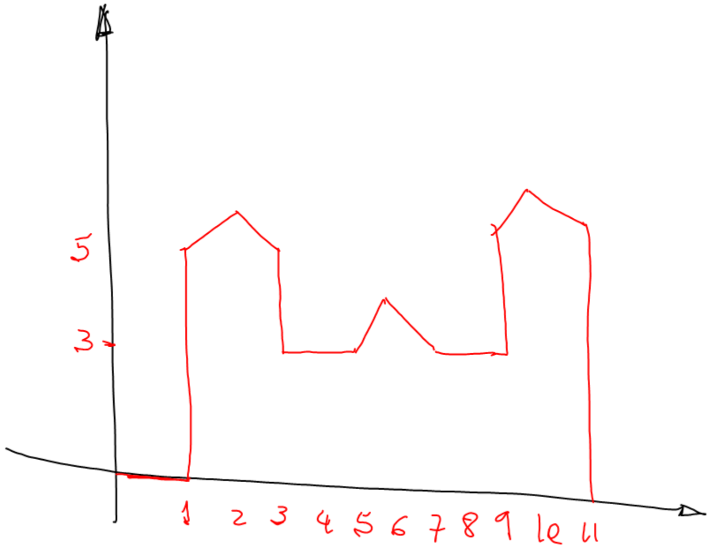
$q(0) = 0$ $\quad i(0) = 0$

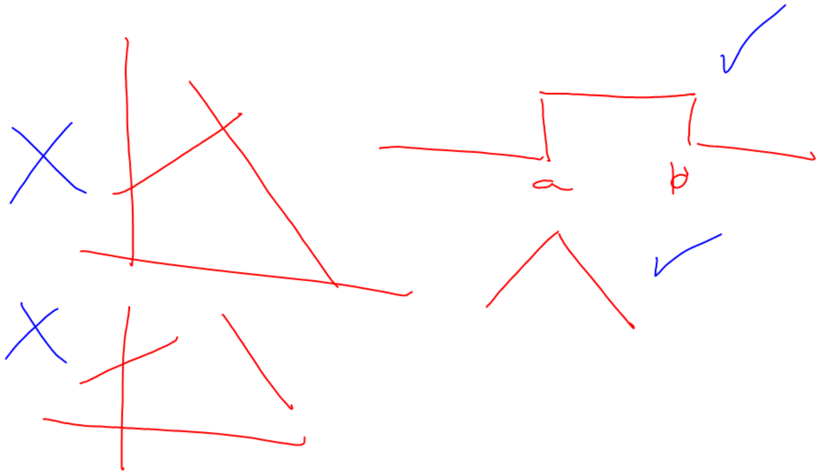
$\boxed{i(t)}$

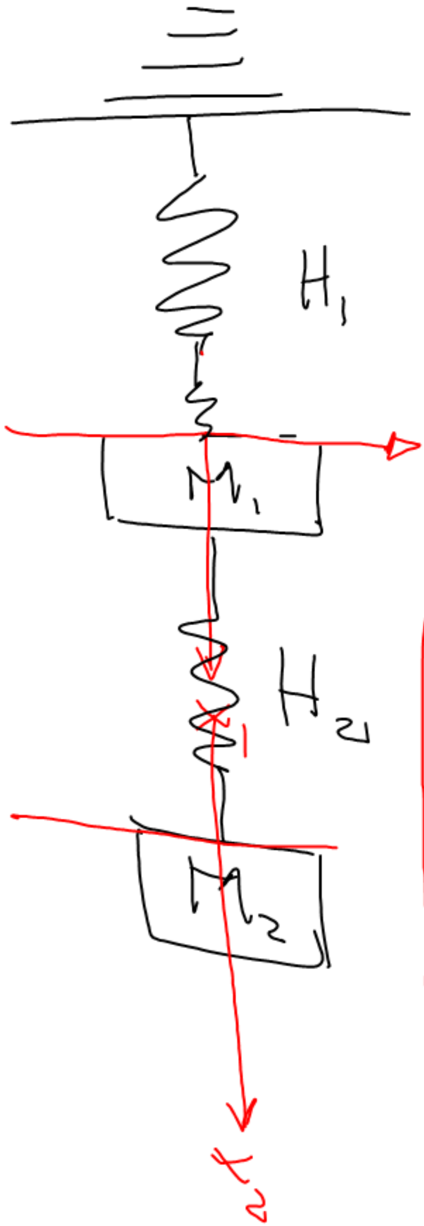
$$\delta(t-a) = \begin{cases} 0 \; ; \; t \neq a \\ \int_{-\infty}^{\infty} \delta(t-a) = 1 \end{cases}$$

Dirac




5
3
1 2 3 4 5 6 7 8 9 10 11


a
b



$$\sum F = M \frac{d^2x}{dt^2}$$

$$-H_1 x_1 = M \frac{d^2x}{dt^2}$$

$$\boxed{\begin{aligned} H_2(x_2-x_1) - H_1 x_1 &= M_1 \frac{d^2x_1}{dt^2} \\ -H_2(x_2-x_1) &= M_2 \frac{d^2x_2}{dt^2} \end{aligned}}$$

$$\boxed{\begin{aligned} \frac{dx}{dt} &= a_{11}x + a_{12}y \\ \frac{dy}{dt} &= a_{21}x + a_{22}y \end{aligned}}$$

$\downarrow$ por sustitución

$$\boxed{\frac{d^2y}{dt^2} + b_1\frac{dy}{dt} + b_2 y = 0}$$

$$\frac{d}{dt}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} \times \begin{bmatrix} x \\ y \end{bmatrix} \qquad \bar{X} = \begin{bmatrix} x \\ y \end{bmatrix} \qquad A = \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix}$$

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

$$\frac{d^3y}{dt^3} + b_1 \frac{d^2y}{dt^2} + b_2 \frac{dy}{dt} + b_3 y = 0$$

$$y = y_1$$

$$\frac{dy}{dt} = \frac{dy_1}{dt} = y_2$$

$$\frac{d^2y}{dt^2} = \frac{dy_2}{dt} = y_3$$

$$\frac{d^3y}{dt^3} = \frac{dy_3}{dt}$$

$$\frac{dy_3}{dt} + b_1 y_3 + b_2 y_2 + b_3 y_1 = 0$$

$$\boxed{\begin{aligned} \frac{dy_1}{dt} &= y_2 \\ \frac{dy_2}{dt} &= y_3 \\ \frac{dy_3}{dt} &= -b_3 y_1 - b_2 y_2 - b_1 y_3 \end{aligned}}$$

$$\frac{d}{dt}\begin{bmatrix} y_1 \\ y_2 \\ y_3 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -b_3 & -b_2 & -b_1 \end{bmatrix} \begin{bmatrix} y_1 \\ y_2 \\ y_3 \end{bmatrix} \qquad \frac{d}{dt}\bar{y} = A_x \bar{y}$$

$$(m-1)(m-2)(m-3)=0$$

$$(m^2-3m+2)(m-3)=0$$

$$(m^3-6m^2+11m-6=0$$

$$\frac{d}{dt}\bar{x} = A \times \bar{x} \qquad \bar{x}(0)$$

$$\left[e^{At}\right] \qquad \bar{x} = \left[e^{At}\right] \cdot \bar{x}(0)$$

$$e^{at} \longrightarrow \frac{de^{at}}{dt} = a\,e^{at}$$

$$e^{at}\Big|_{t=0} = 1$$

$$\frac{d}{dt}\left[e^{At}\right] = A\left[e^{At}\right]$$

$$\left[e^{At}\right]_{t=0} = I.$$

$$\left(e^{At}\right)^{-1} = e^{A(-t)} \qquad \left[e^{At}\right] \times \left[e^{At}\right]^{-1} = I.$$