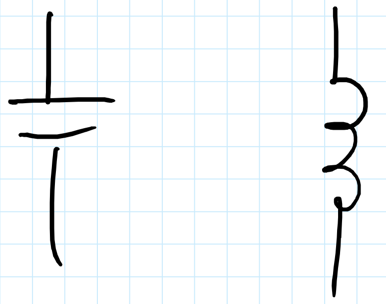
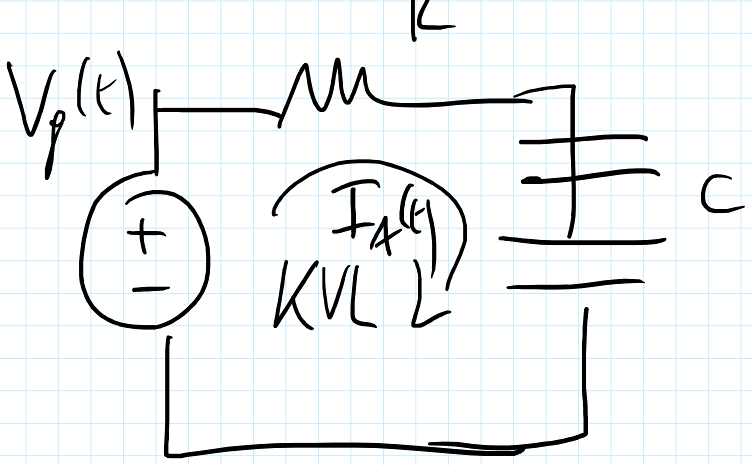
CIRCUITI I° ORDINE

05 April 2017 15:27

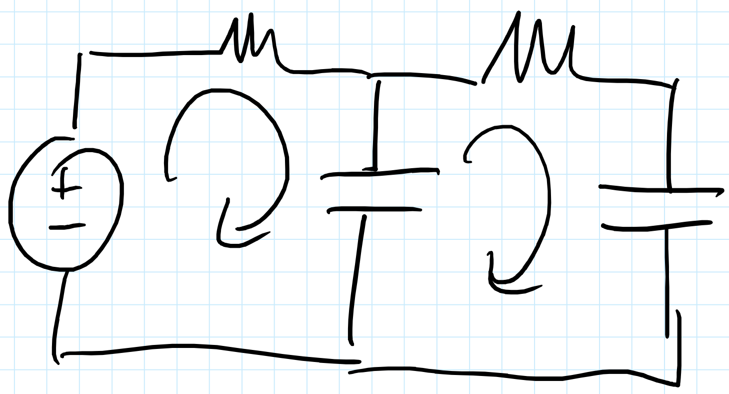
N_{eq} { 1° ord: $\dot{x} + x = f$



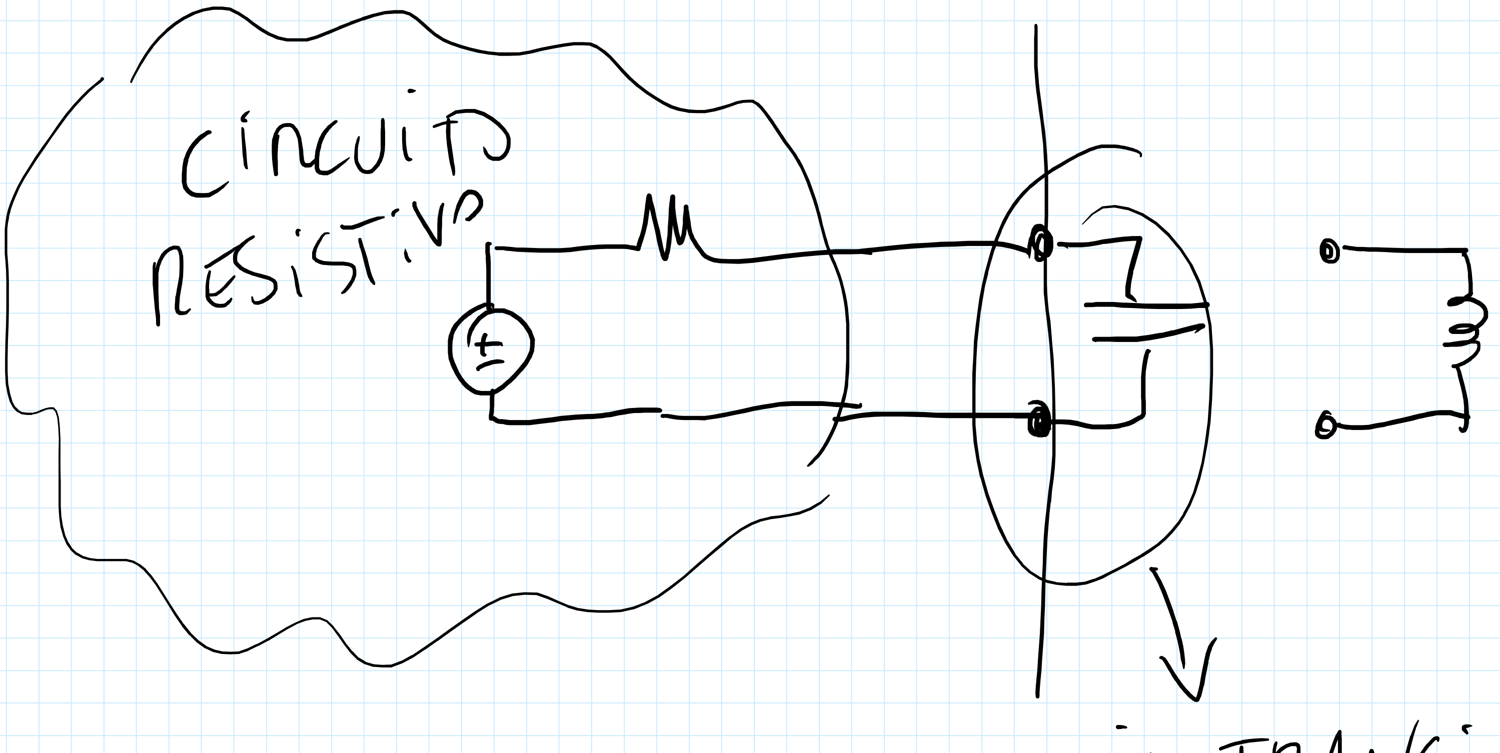


$$V_\varphi(t) = i_A(t)\cdot R + \frac{1}{C}\int_{-\infty}^{t} i_A(\tau)\,d\tau$$

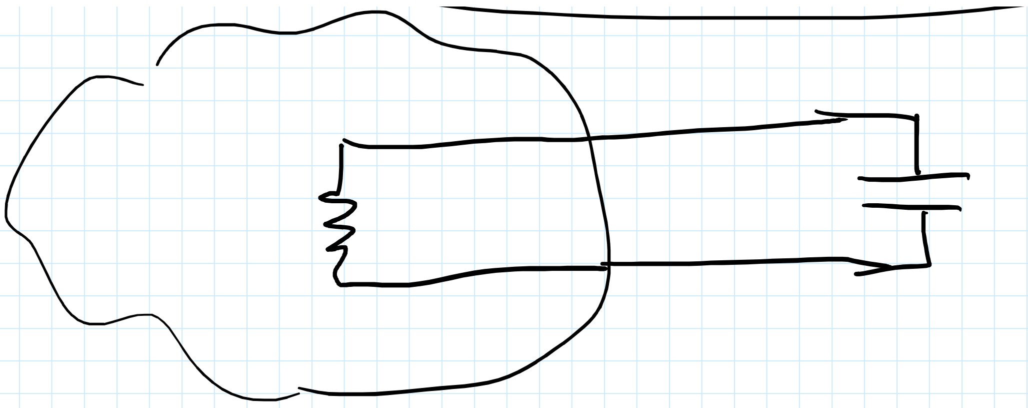
$$\dot{V}_\varphi(t) = \dot{i}_A(t)R + \frac{1}{C_{TOT}}\, i_A(t)$$

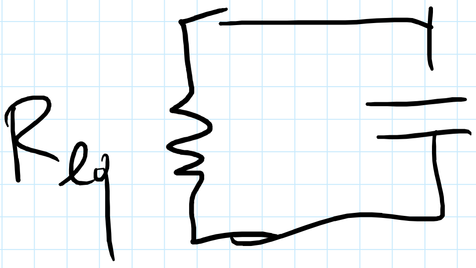


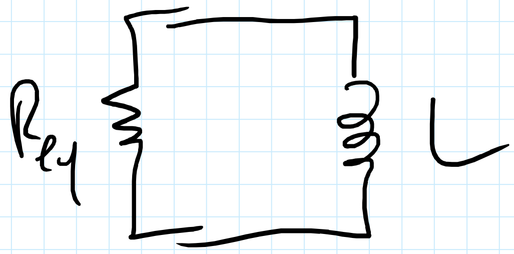
{ I° ord
{ I^a $\Rightarrow$? 1 SOLA EQ
2° ord.



IL TRANSITORIO

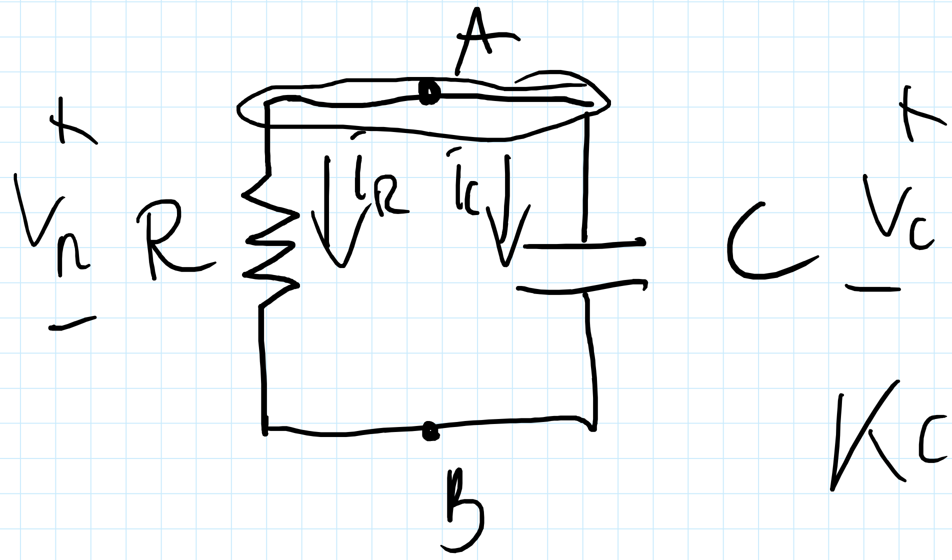



Req


Req
L

RC AUTONOMO

05 April 2017 15:39



$V_c(t)$

KCL - (A) →

$$i_R + i_C = 0$$

$$\frac{V_c}{R} + C\frac{dV_c(t)}{dt} = 0$$

$$\dot{V}_c(t) = -\frac{V_c}{RC} \Rightarrow V_c(t) = A e^{-\frac{t}{RC}}$$

$$\frac{dV_c(t)}{dt} = -\frac{V_c(t)}{RC} \Rightarrow \int_{+0}^{t'} \frac{dV_c(t)}{V_c(t)} = \int_{+0}^{t'} -\frac{dt}{RC}$$

$$df(x) = dg(x)$$

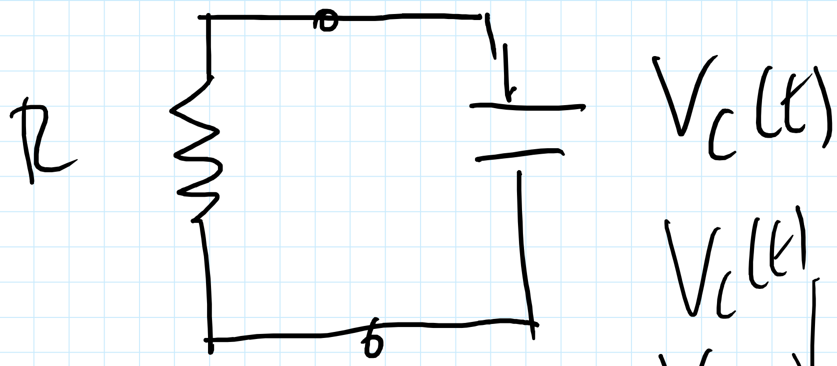
$$\int_{-\infty}^{y} \frac{dx}{x} = \ln y$$

$$\ln V_c(t)\Big|_{-\infty}^{t'} = -\frac{1}{RC}\int_{-\infty}^{t} dt$$

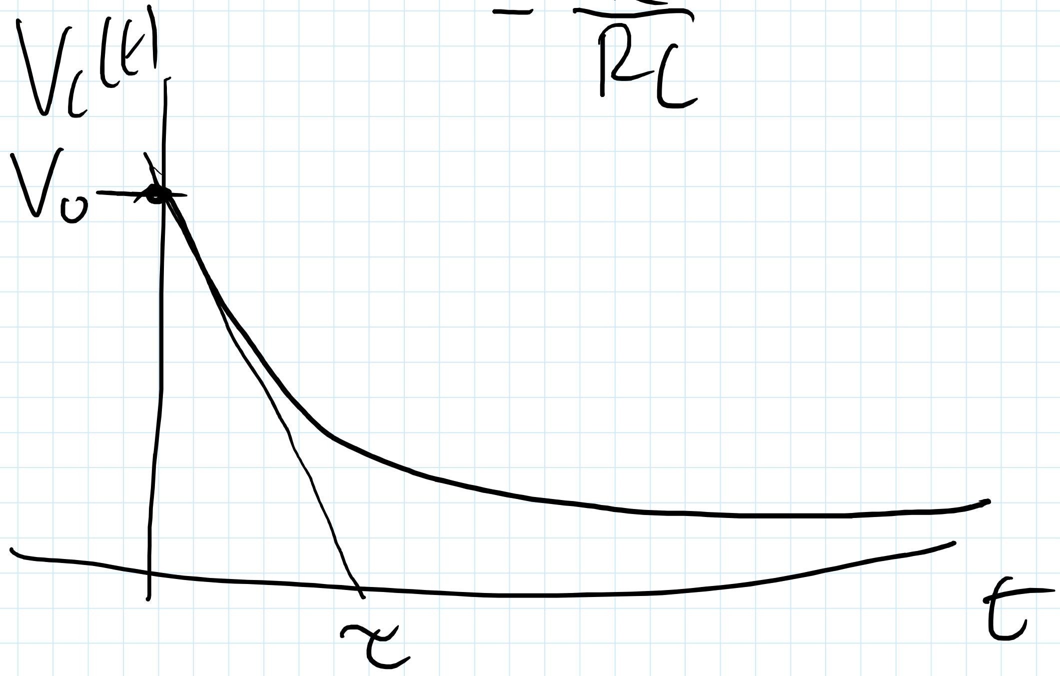
$$\ln V_c(t)\Big|_0^t = -\frac{t}{RC}$$

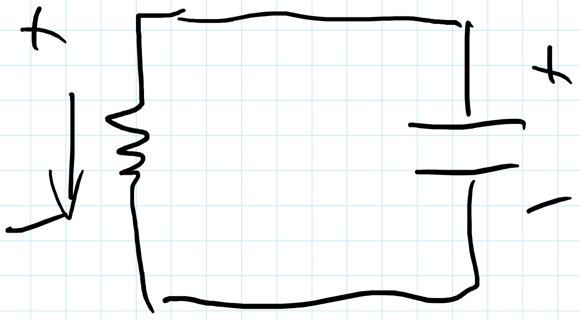
$$\boxed{V_c(t) = V_0 e^{-\frac{t}{RC}} = V_0 e^{-\frac{t}{\tau}}}$$

$$\tau = RC$$



$$-\frac{1}{RC}$$





$$V_C(t) = V_0 e^{-\frac{t}{\tau}}$$

$$\frac{1}{2} C V_C^2(t) = \frac{1}{2} C V_0^2 e^{-\frac{2t}{\tau}}$$

$$P_R(t) = \frac{V_R^2(t)}{R} = \frac{V_0^2 e^{-\frac{2t}{\tau}}}{R}$$

$$W_R(t) = \int_0 P_R(t')\,dt' = \frac{V_0^2}{R} \int_0 e^{-\frac{2t}{\tau}}\,dt'$$

$$- \frac{\tau}{2} \frac{V_0^2}{R}\, e^{-\frac{2t'}{\tau}} \Big|_0^t$$

$$W_R^{\text{ASSORBITA}}(t) - \frac{\tau}{2} \frac{V_0^2}{R} \left[e^{-\frac{2t}{\tau}} - 1 \right]$$

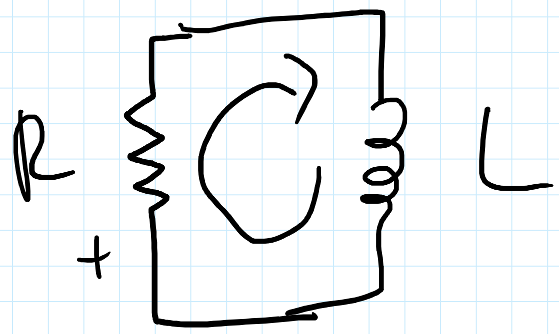
$$W_R(t) = \frac{\tau}{2} \frac{V_0^2}{R} \left[1 - e^{-\frac{2t}{\tau}} \right]$$

$$t \to \infty \quad W_R(+\infty) = \frac{\tau}{2} \frac{V_0^2}{R} \qquad \tau = RC$$

$$= \frac{RC}{2} \frac{V_0^2}{R} = \frac{1}{2} C V_0^2$$

RL AUTONOMO

05 April 2017 16:00



$i_L(t)$

$$i_L(t) \cdot R + \underbrace{L \frac{d i_L(t)}{dt}}_{V_L(t)} = 0$$

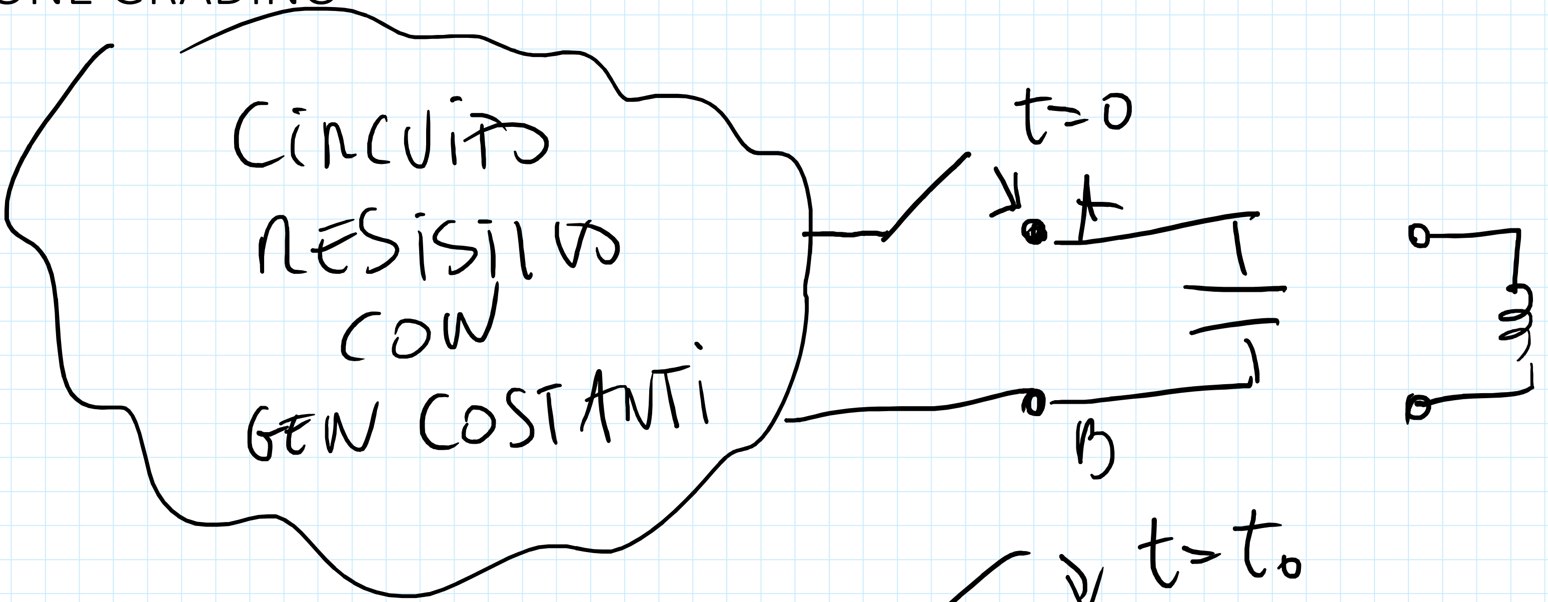
$$\frac{d i_L(t)}{dt} = -\frac{R}{L} i_L(t) \rightarrow i_L(t) = i_L(0) e^{-\frac{R}{L}t}$$

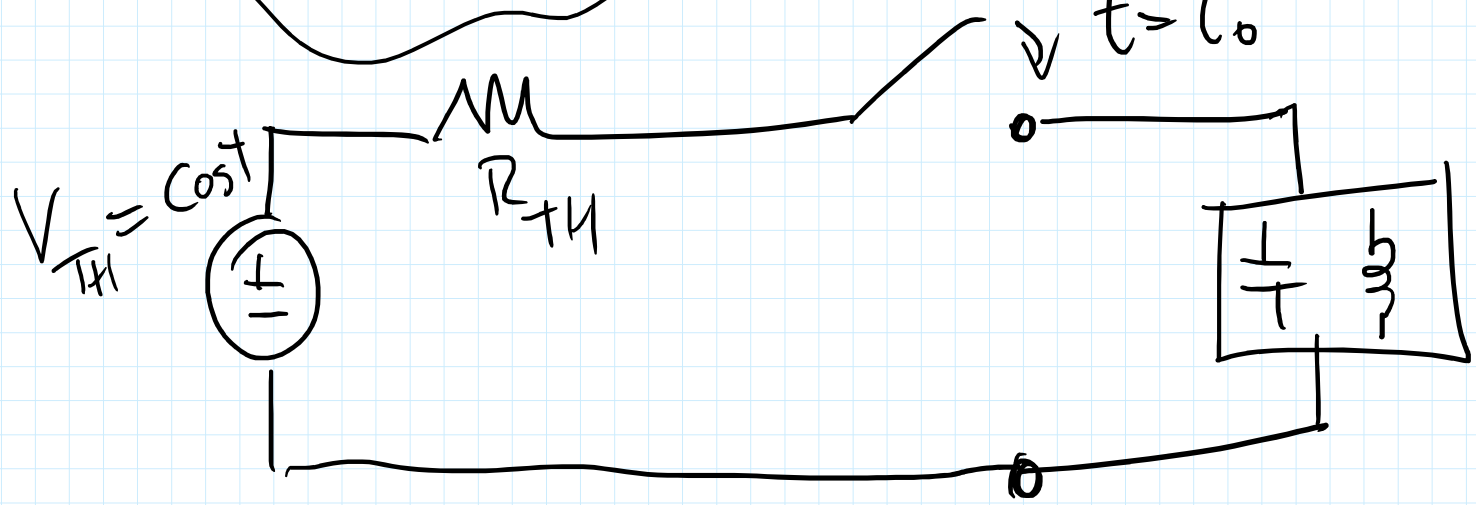
$$\frac{d V_C(t)}{dt} = -\frac{1}{RC} V_C(t) \rightarrow V_C(t) = V_0 e^{-\frac{t}{RC}}$$

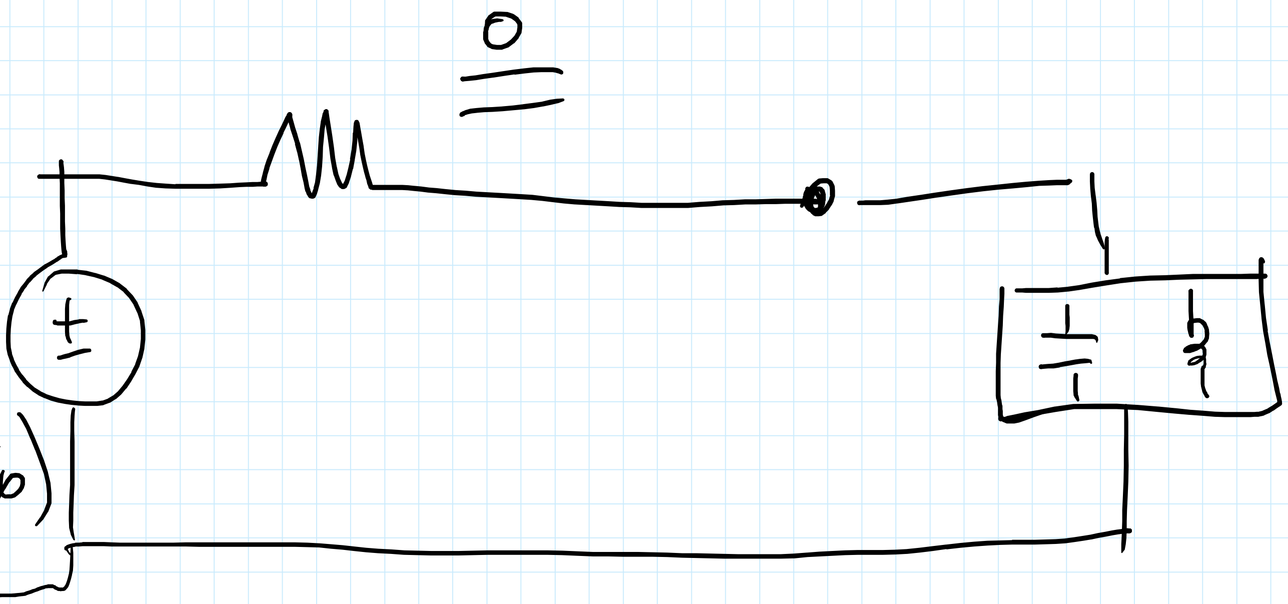
$$i_L(t) = i_L(0) e^{-\frac{t}{\tau}} \qquad \tau = \frac{L}{R}$$

FUNZIONE GRADINO

05 April 2017 16:08

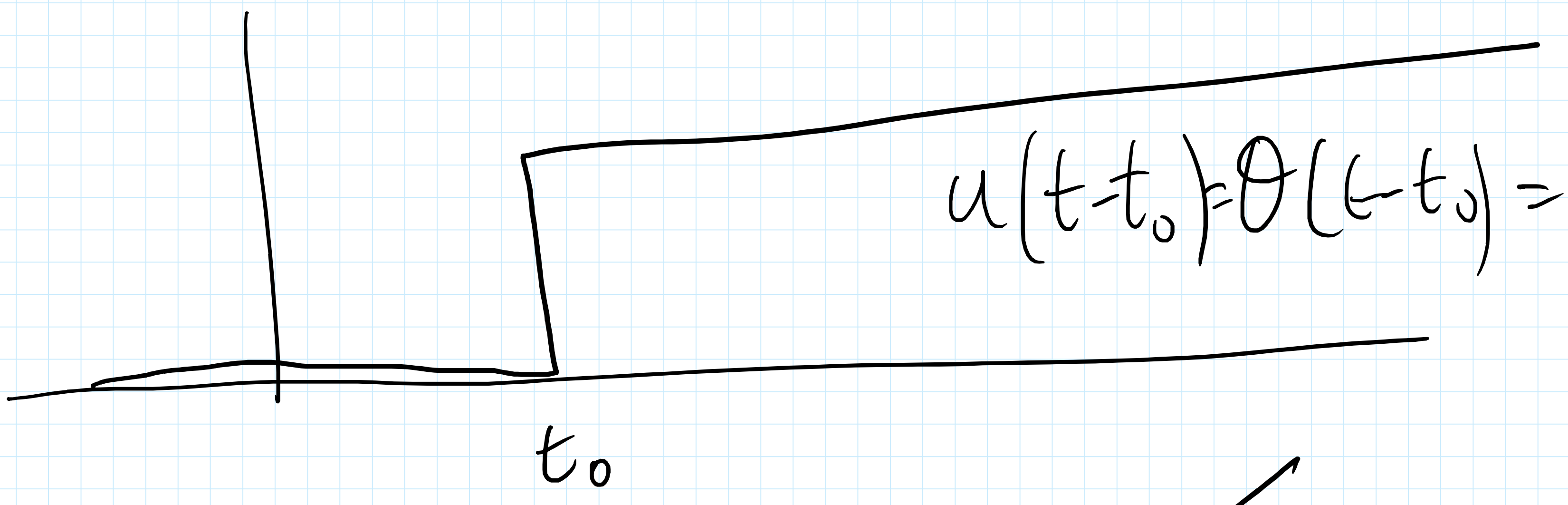






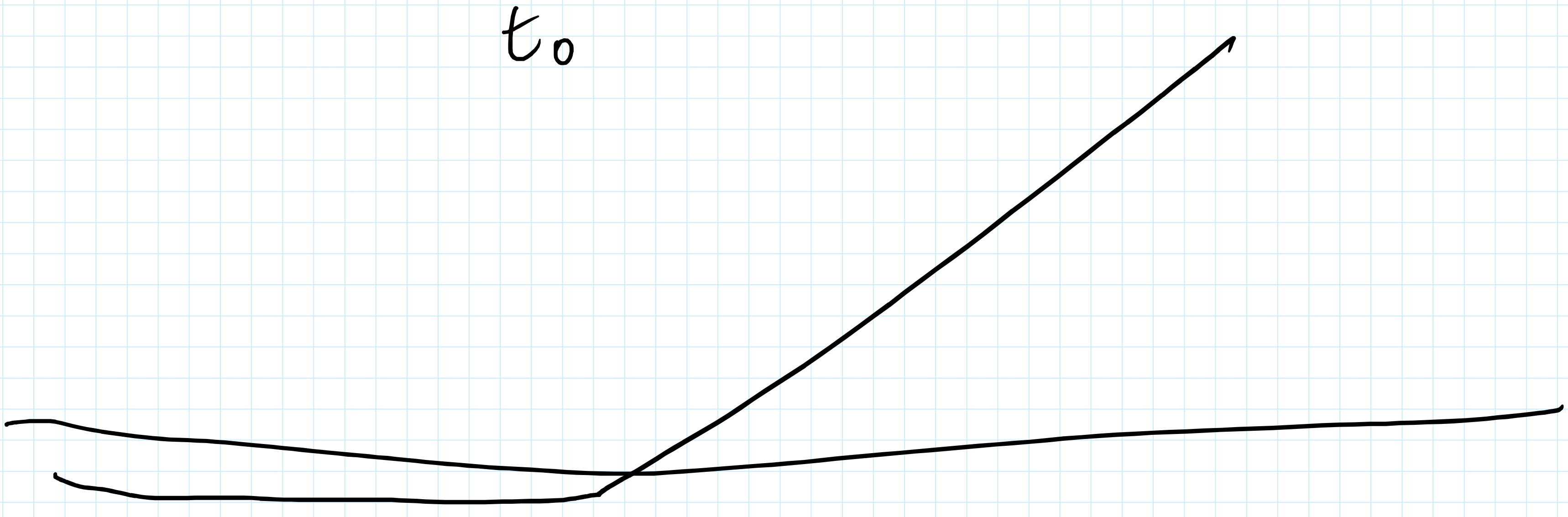
$$\boxed{V_S(t) = V_{TH}\, u(t-t_0)}$$

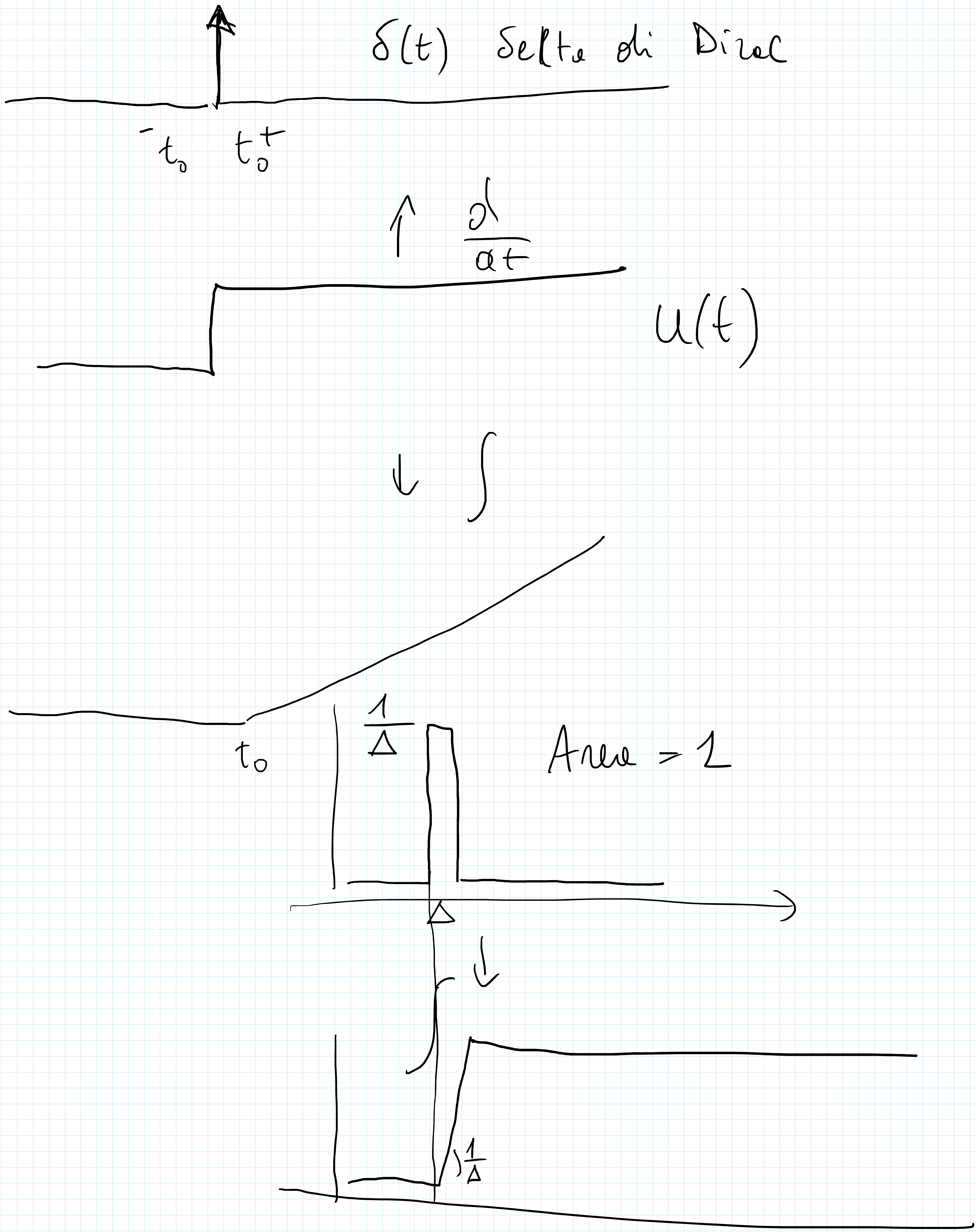
$$u(t) = \theta(t) \quad \text{Heaviside}$$

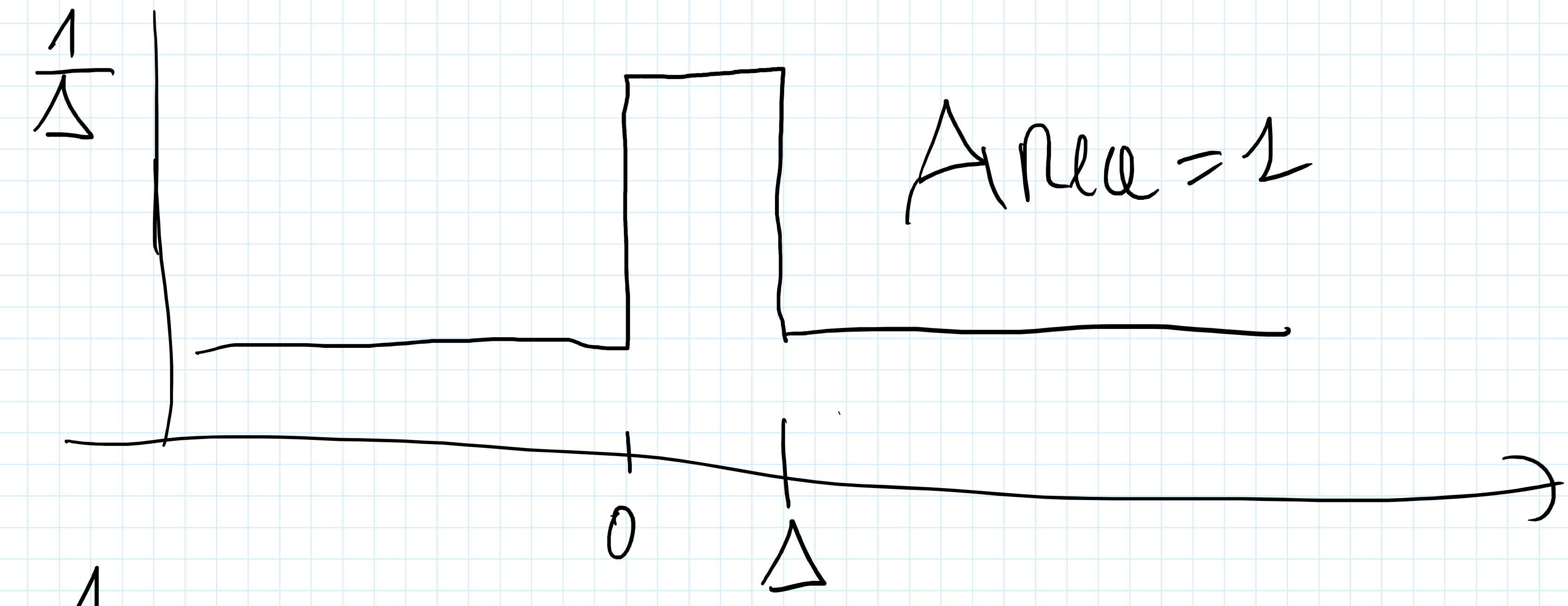


$$u(t-t_0) = \theta(t-t_0) = \begin{cases} 1 & t > t_0 \\ 0 & t < t_0 \end{cases}$$

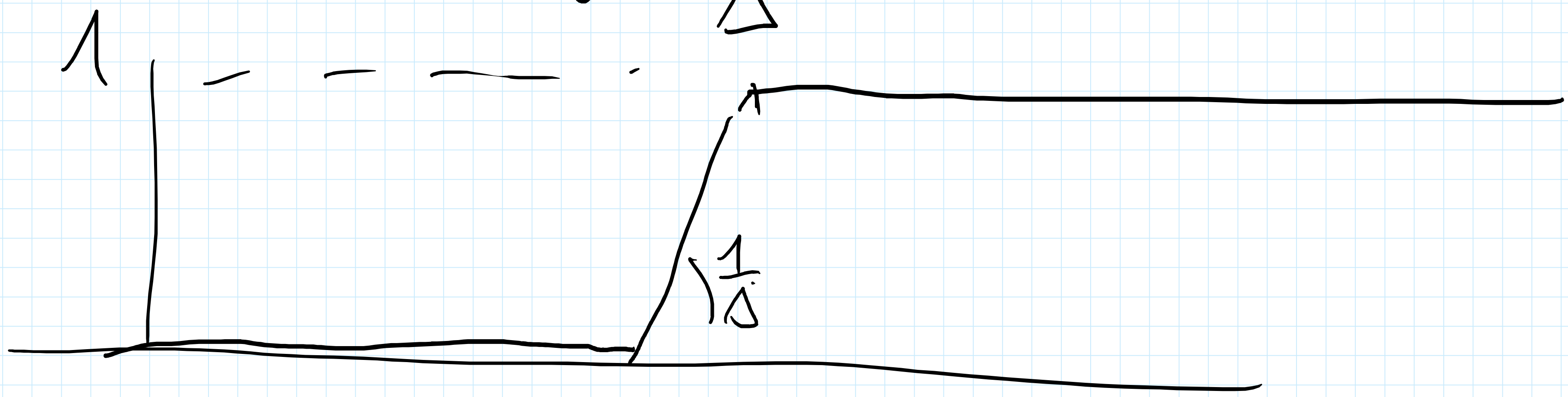
t_0 non è definita




$\delta(t)$ delta di Dirac
t_0^- t_0^+
$\frac{d}{dt}$
$u(t)$
$\int$
t_0
$\frac{1}{\Delta}$
Area = 1
Δ
$\frac{1}{\Delta}$

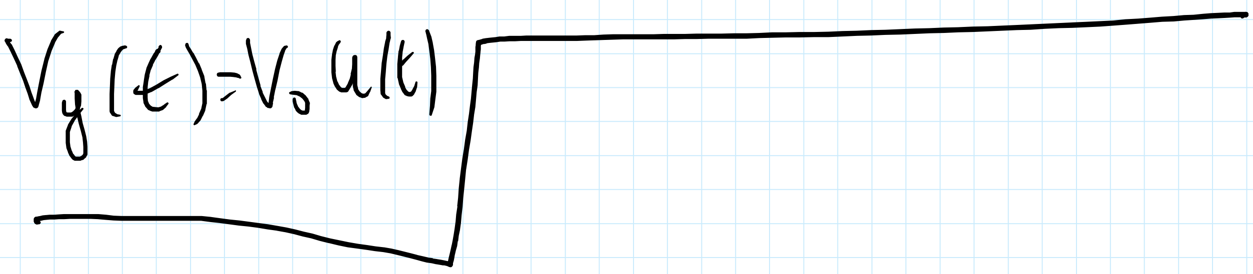


Area = 1



$\lim_{\Delta \to 0}$ $\qquad \delta(t) = \dfrac{d\,u(t)}{dt}$

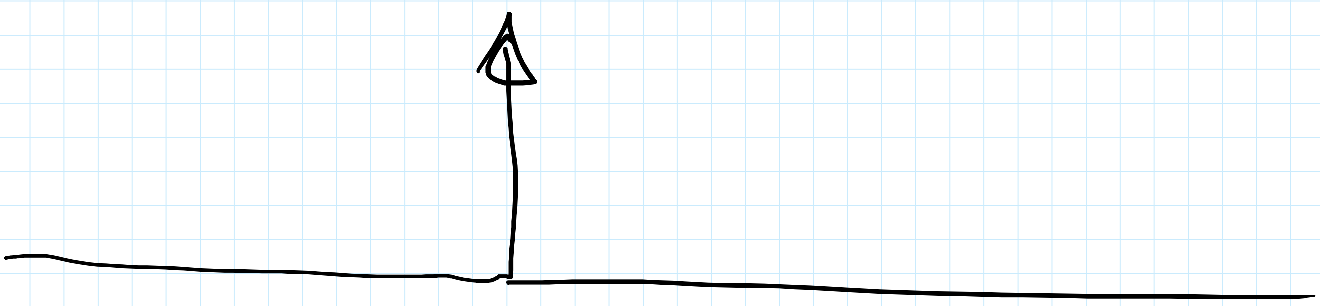
$V_g(t) = V_0\, u(t)$

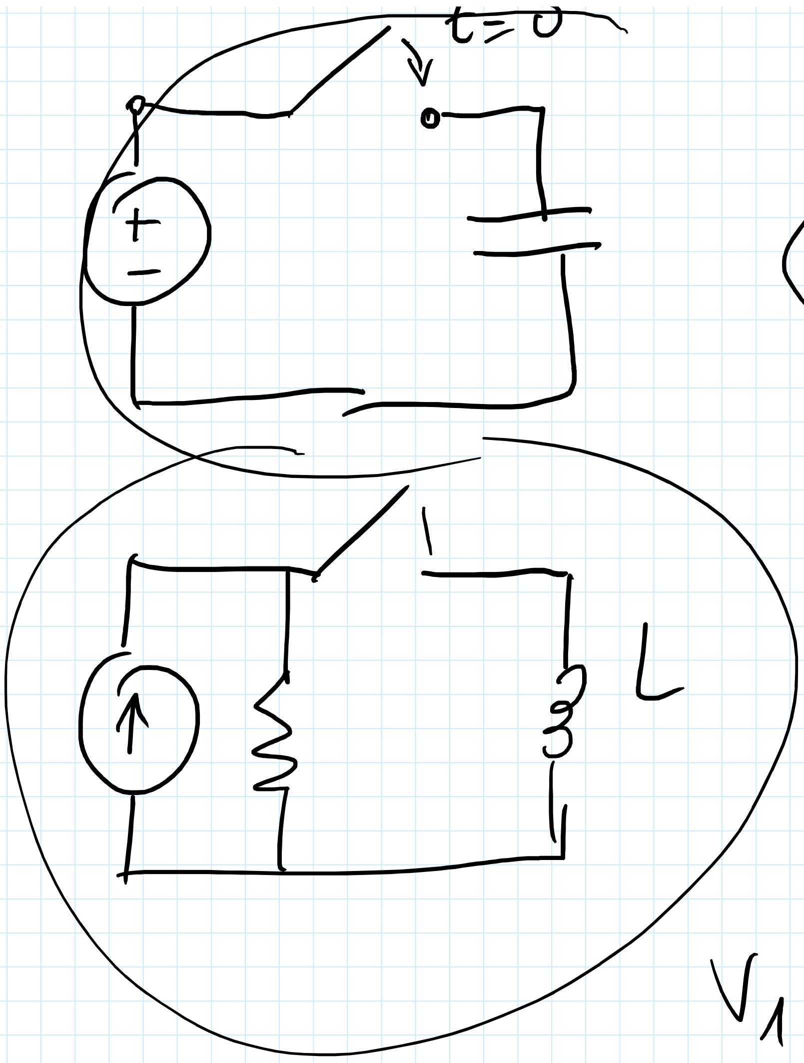


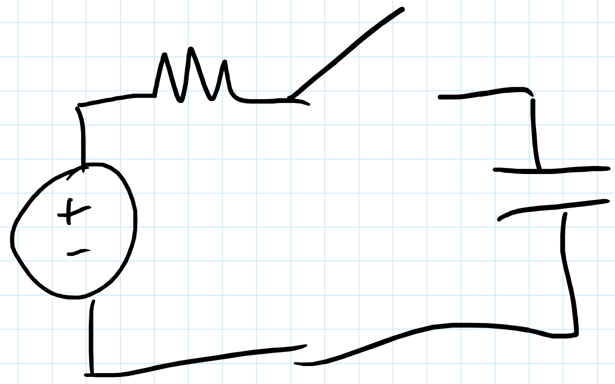
$V_c(t) = u(t)$

$\Downarrow$

$$\boxed{i_c(t) = C\,\frac{dV_c(t)}{dt}}$$







$$i_L(t) = i_g\, u(t)$$

$$V_L(t) = L \frac{d i_L(t)}{dt} = L\,\delta(t)$$