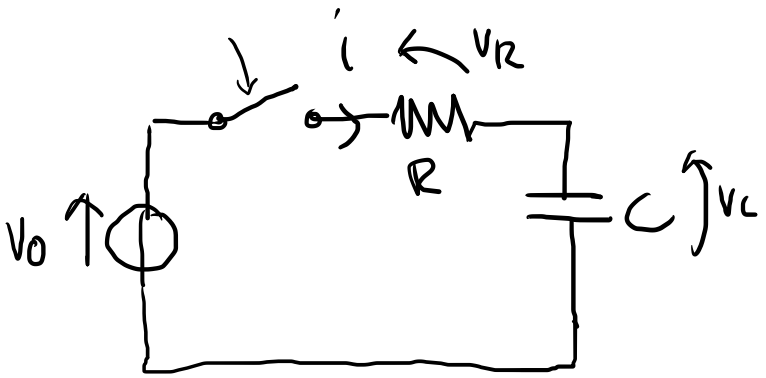
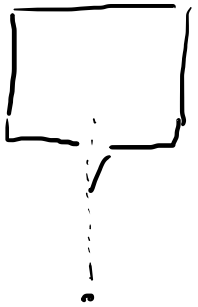
# 155 - RC τ



$$V_0 = V_R + V_C =$$

$$i = C \cdot \frac{dV}{dt} \qquad V_R = iR$$

$$\frac{dV_c}{dt} = \frac{i}{C} \qquad V_C(t) = \frac{1}{C}\int i \cdot dt$$

$\uparrow$ $\uparrow$

$\int$ $\int$

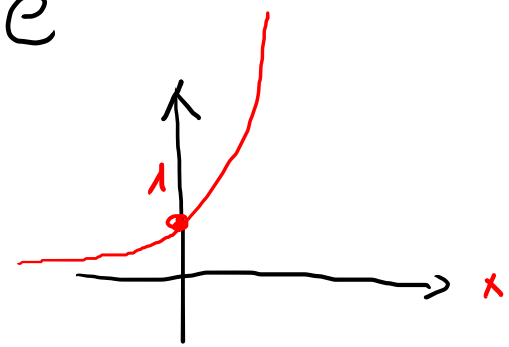
$$V_0 = iR + \frac{1}{C}\int i \cdot dt$$

$\downarrow$

$$0 = R \cdot \frac{di}{dt} + \frac{1}{C} \cdot i \qquad \sim i(t)$$

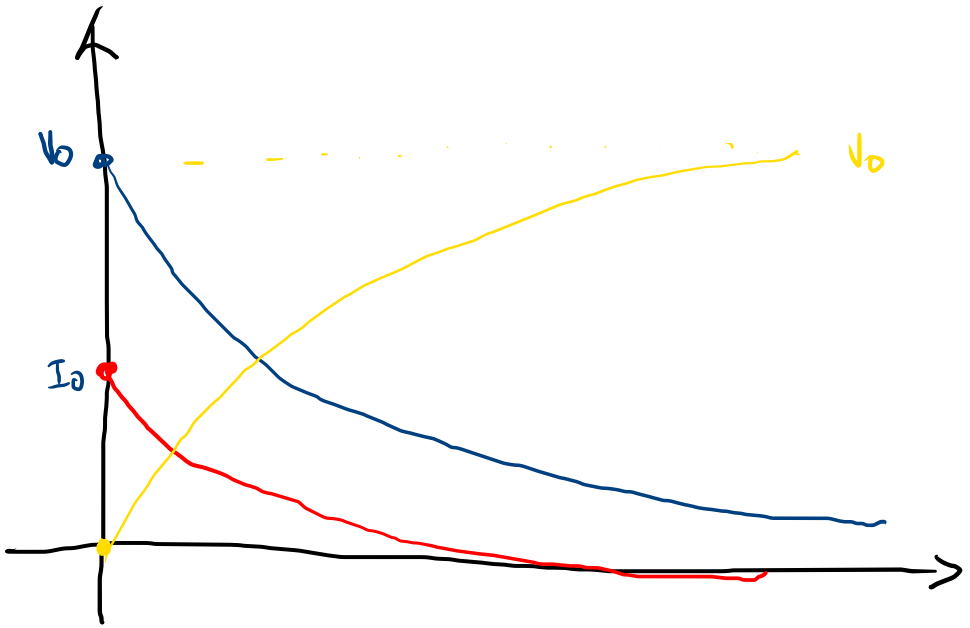
$$e^x \rightarrow e^x$$

$$i(t) = I_0 e^{-\frac{t}{RC}}$$



$$V_R = \underbrace{R \cdot I_0}\, e^{-\frac{t}{RC}} = V_0\, e^{-\frac{t}{RC}} \quad \leftarrow$$

$$V_C = \frac{1}{C}\int i\,dt = \frac{1}{C}\underbrace{\int_0^t I_0 \cdot e^{-\frac{t}{RC}}\,dt} \rightsquigarrow V_C = V_0\left[1 - e^{-\frac{t}{RC}}\right]$$




$\Rightarrow$ $i = I_0 \cdot e^{-\frac{t}{RC}}$

$RC = \tau$

$e^x$

$e^{-x}$

$\tau < RC = 1\,\mu F \cdot 1\,k\Omega = 1 \cdot 10^{-6} \cdot 1 \cdot 10^{3} = 10^{-3}$ 0,001 s

$$V_c = V_0 \left(1 - e^{-\frac{t}{RC}}\right) \qquad t = RC$$

$$V_0 \left(1 - e^{-\frac{RC}{RC}}\right)$$

$$1 - e^{-1} \qquad 1 - \frac{1}{2{,}7} \sim \underline{0{,}63}$$

↳ 2,7...

1

$$1 - e^{-\frac{2RC}{RC}} \qquad 1 - \frac{1}{2{,}7^2} \rightsquigarrow 0{,}86 \sim$$