

ERT 20

Opplg 3) $\frac{d}{dt} i(0) = 0 \Rightarrow u_c = 0$

Opplg 4) $t \rightarrow \infty \Rightarrow u_c = 5V$

Opplg 5) $U = u_R + u_c$

$$i(t) = C \frac{d}{dt} u_c(t)$$

$$U = u_c + R i(t)$$

$$U = u_c + R C \frac{d}{dt} u_c(t)$$

$$\frac{d}{dt} u_c(t) + \frac{1}{RC} u_c(t) = \frac{U}{RC}$$

$$R = 1 \text{ M}\Omega \quad C = 1 \mu\text{F}$$

$$RC = 10^6 \cdot 10^{-6} = 10^0 = 1$$

$$\frac{d}{dt} u_c(t) + u_c(t) = U \quad | \cdot e^t$$

$$\frac{d}{dt} (u_c e^t) = U e^t \quad | \int dt$$

$$u_c e^t = U e^t + D \quad | \cdot e^{-t}$$

$$u_c(t) = U + D e^{-t}$$

$$u_c(t) = U + D e^{-t}$$

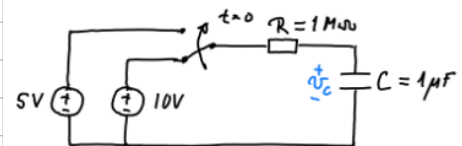
$$u_c(0) = 0$$

$$U + D = 0$$

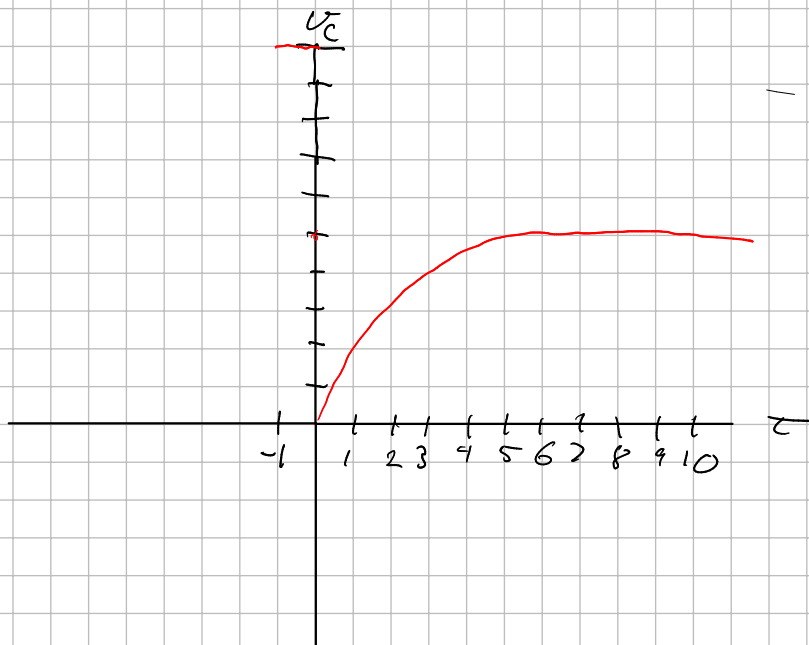
$$D = -U$$

$$u_c(t) = U - U e^{-t} \quad U = 5V$$

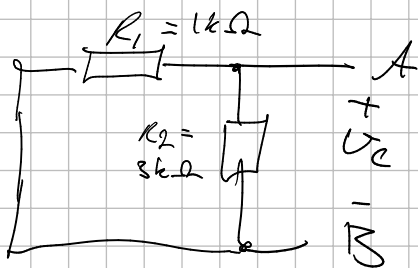
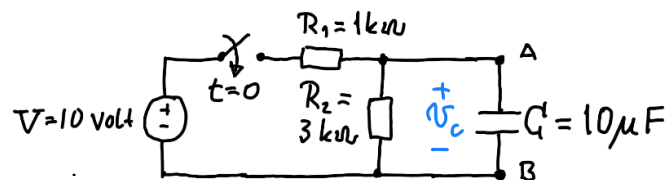
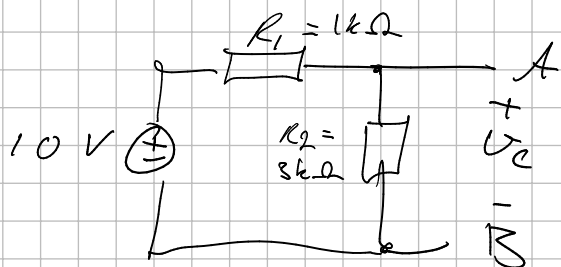
$$u_c(t) = 5(1 - e^{-t})$$



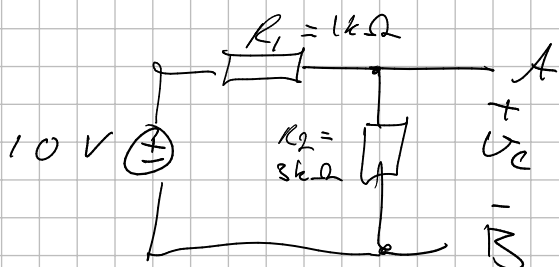
01/11/16



01/11/17 $U_C = 5V$



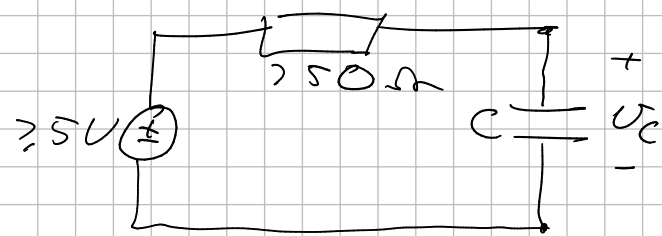
$$R_{th} = \frac{R_1 R_2}{R_1 + R_2} = \frac{1 \cdot 3}{4} = 750 \Omega$$



→ $\frac{C}{\text{Span}} \text{ Verste}$

$$U_{th} = U \frac{R_2}{R_1 + R_2}$$

$$U_{th} = 10 \cdot \frac{3}{4} = 7,5V$$



01/13 8) $i(t) = C \frac{d}{dt} U_C$ $R = 50 \Omega$ $C = 10 \mu F$

$$U = R i(t) + U_C$$

$$U = R C \frac{d}{dt} U_C + U_C$$

$$U = \frac{d}{dt} U_C + \frac{1}{RC} U_C$$

$$U_C(t) = R C U + D e^{-\frac{1}{RC} t}$$

$$U_C(0) = 0$$

$$R C U + D = 0$$

$$D = -R C U$$

$$U_C(t) = R C U (1 - e^{-\frac{1}{RC} t})$$

$$x' + b x = k$$

$$\frac{d}{dt}(x e^{bt}) = k e^{bt}$$

$$x e^{bt} = \frac{1}{b} k e^{bt} + C \quad \left| \int \cdot e^{-bt} \right.$$

$$x(t) = \frac{k}{b} + C e^{-bt}$$

$$U = R i(t) + U_C$$

$$U = R C \frac{d}{dt} U_C + U_C$$

$$U = \frac{d}{dt} U_C + \frac{1}{RC} U_C \quad \left| \cdot e^{\frac{1}{RC} t} \right.$$

$$\frac{d}{dt} U_C e^{\frac{1}{RC} t} + \frac{1}{RC} U_C e^{\frac{1}{RC} t} = U e^{\frac{1}{RC} t}$$

$$\frac{d}{dt} (U_C e^{\frac{1}{RC} t}) = U e^{\frac{1}{RC} t} \quad \left| \cdot \int \right.$$

$$U_C e^{\frac{1}{RC} t} = R C U e^{\frac{1}{RC} t} + D \quad \left| \cdot e^{-\frac{1}{RC} t} \right.$$

$$U_C(t) = R C U + D e^{-\frac{1}{RC} t}$$

$$U_C(0) = 0$$

$$D = -R C U$$

