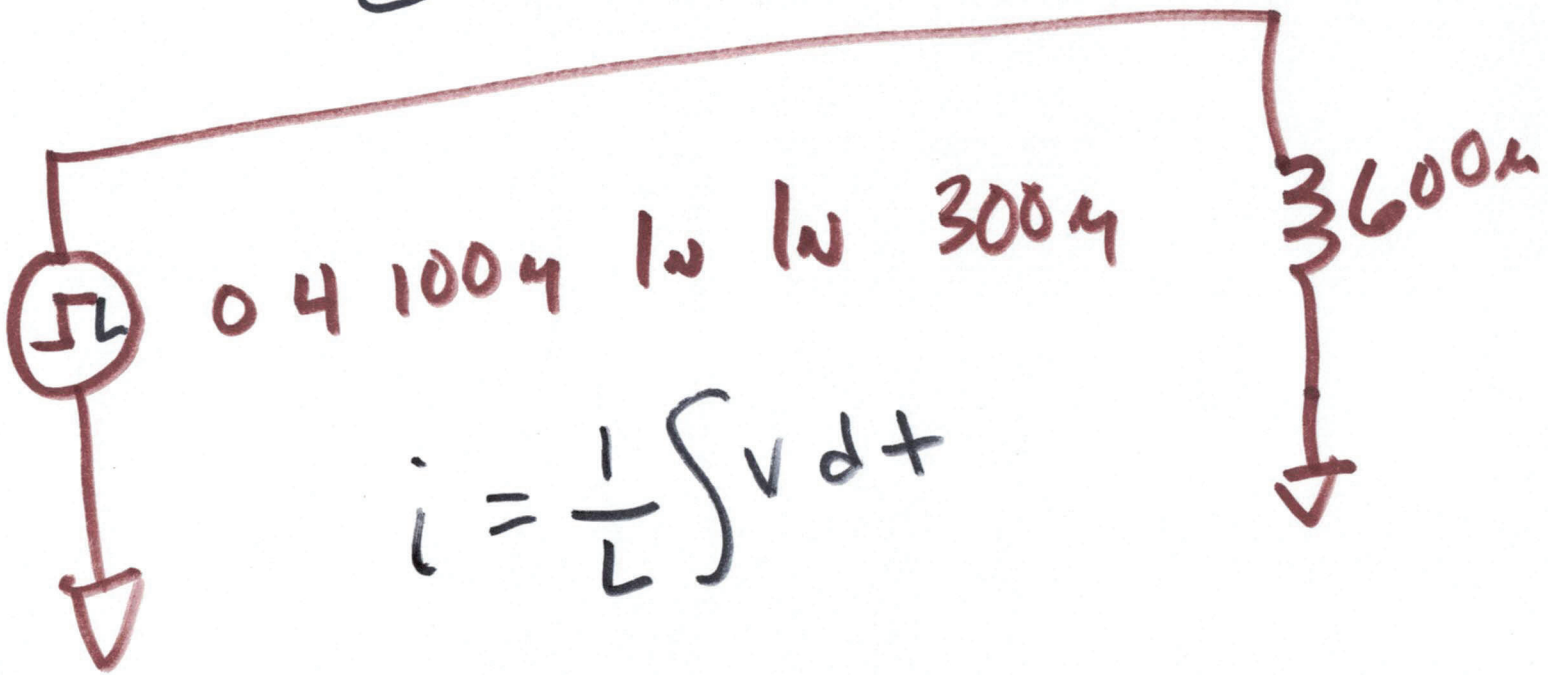
EE 220 CIRCUITS I

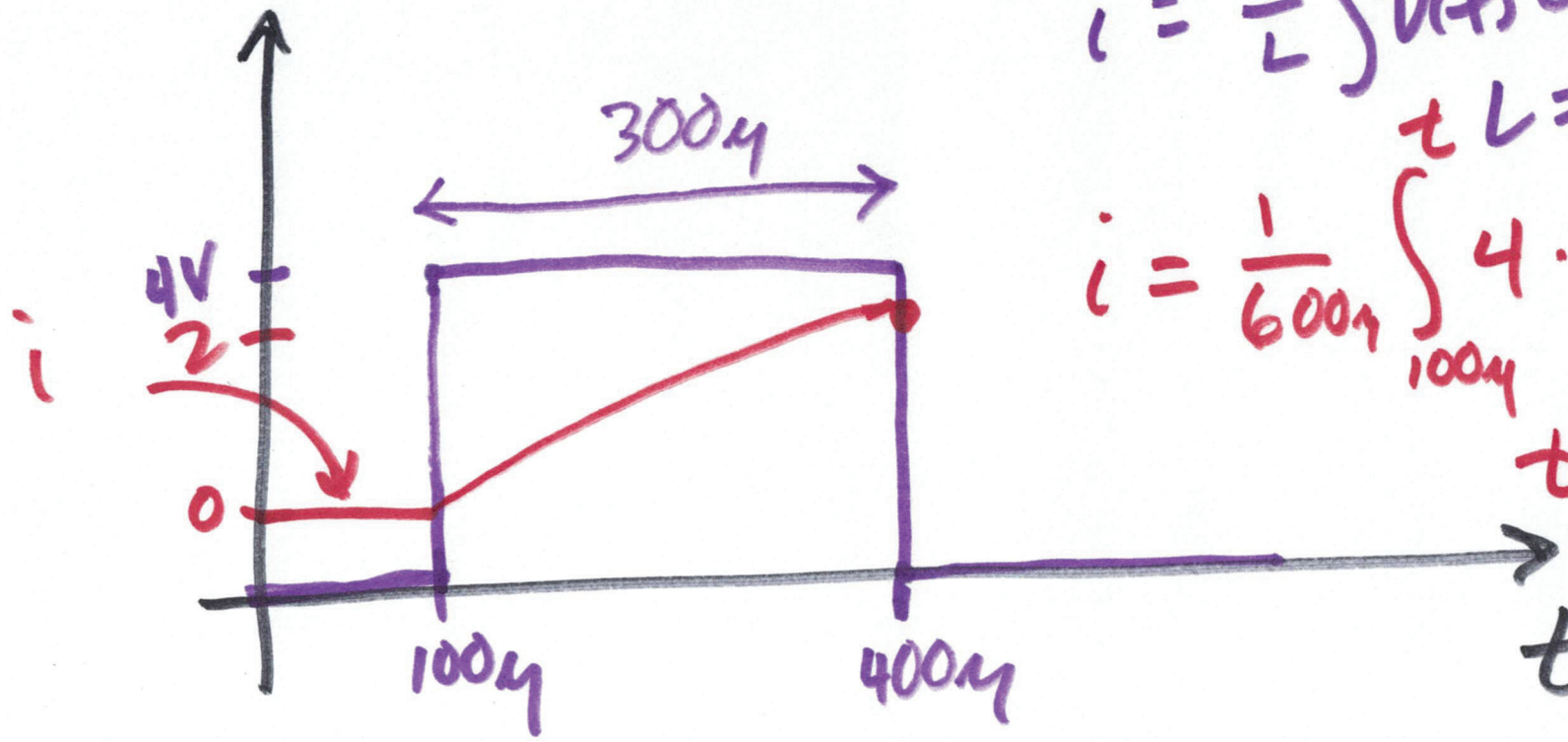
OCT. 31, 2022

Lecture 17

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



$$i = \frac{1}{L}\int v\,dt$$



$$i = \frac{1}{L}\int v(t)\,dt$$

$$t\,L = 600\mu$$

$$i = \frac{1}{600\mu}\int_{100\mu}^{t} 4 \cdot dt$$

$$t \geq 100\mu$$

$$t \leq 400\mu$$

$$i(t) = \frac{4}{600\mu}(t - 100\mu)$$

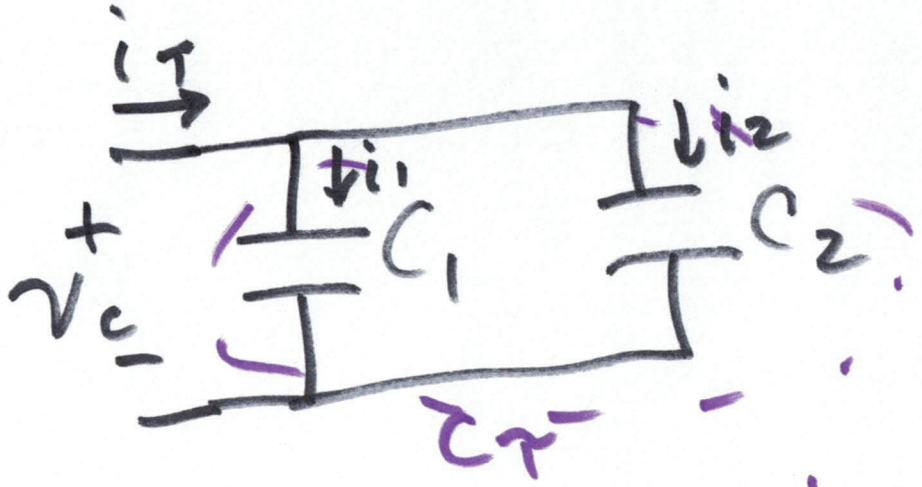
$$2A = \frac{4(400\mu - 100\mu)}{600\mu}$$

$$i(t) = \frac{1}{L}\int_{t_1}^{t_2} v(t)\cdot dt + I(t_i^-)$$

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

$$i = C\frac{dv}{dt}$$

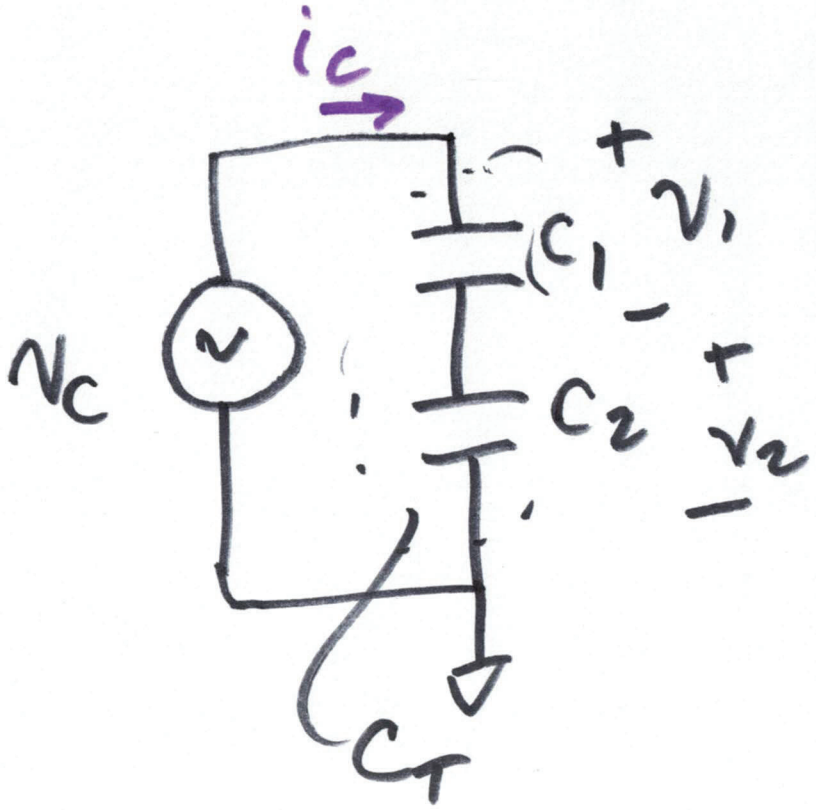
$$v(t) = \frac{1}{C}\int_{t_1}^{t_2} i(t)\cdot dT + v(t_i^-)$$



$$i_T = C_T \cdot \frac{dv_c}{dt} = i_1 + i_2$$

$$= C_1 \cdot \frac{dv_c}{dt} + C_2 \cdot \frac{dv_c}{dt}$$

$$= \underbrace{(C_1 + C_2)}_{C_T} \frac{dv_c}{dt}$$



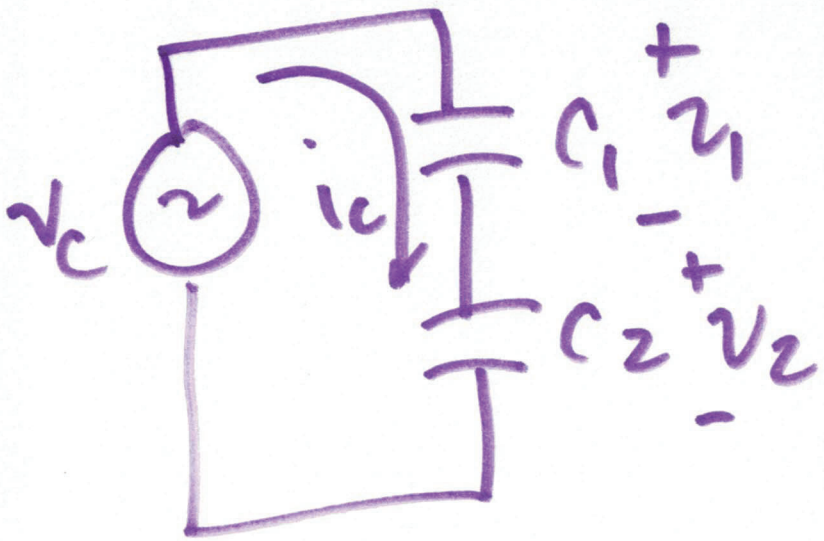
$$i_C = C_T \cdot \frac{dv_C}{dt}$$

$$v_C = v_1 + v_2$$

$$i_C = C_1 \cdot \frac{dv_1}{dt} = C_2 \frac{dv_2}{dt}$$

$$i_C = C_T \cdot \frac{d(v_1 + v_2)}{dt} = C_T\left(\frac{dv_1}{dt} + \frac{dv_2}{dt}\right)$$

$$= \frac{C_1\, dv_1}{dt}$$



$$v_1 = \frac{1}{C_1} \cdot \int i_c \cdot dt$$

$$v_2 = \frac{1}{C_2} \cdot \int i_c \cdot dt$$

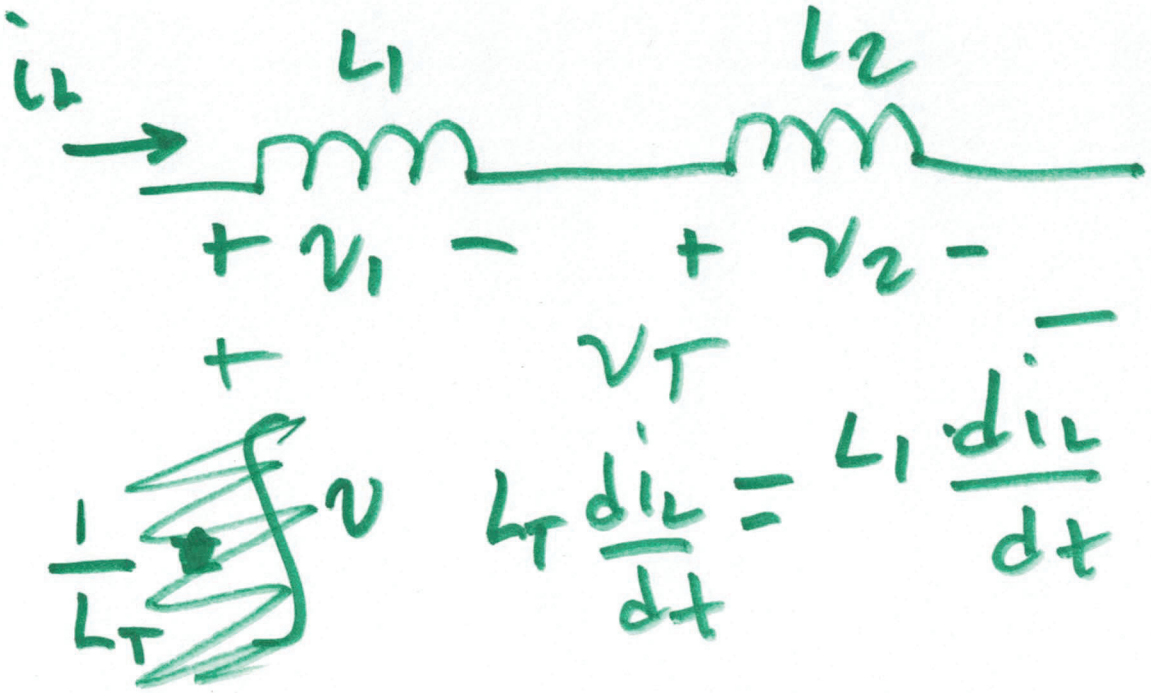
$$v_c = \frac{1}{C_T} \int i_c \, dt$$

$$C_T = \frac{C_1 \cdot C_2}{C_1 + C_2}$$

$$v_c = v_1 + v_2$$

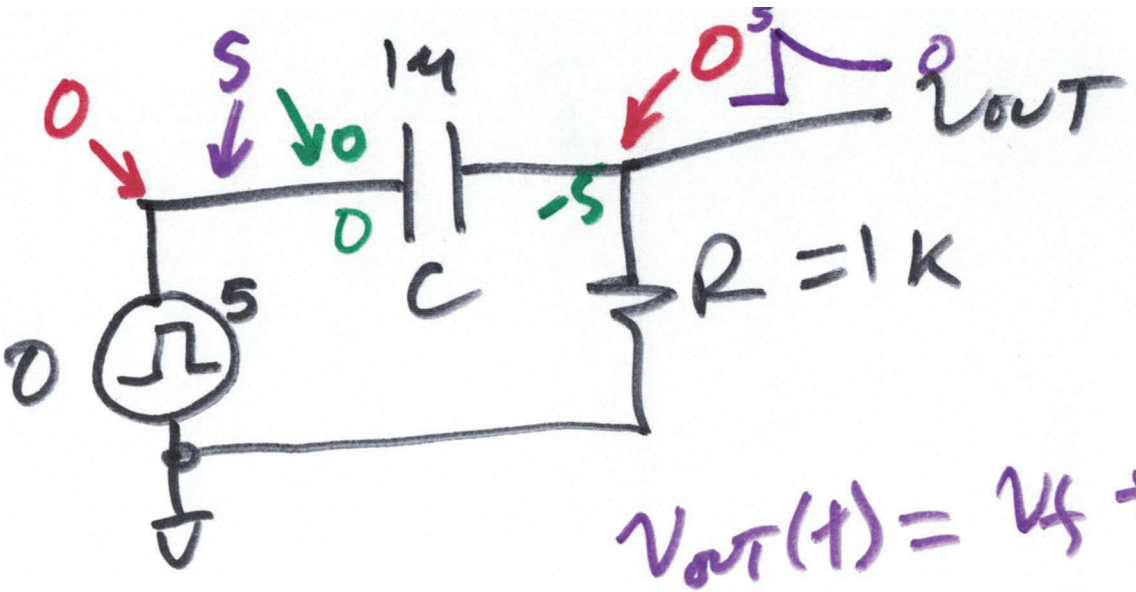
$$\frac{1}{C_T} \int i_c \cdot dt = \frac{1}{C_1} \int i_c \cdot dt + \frac{1}{C_2} \int i_c \, dt$$

$$\frac{1}{C_T} = \frac{1}{C_1} + \frac{1}{C_2}$$



$$L_T \frac{di_L}{dt} = L_1 \frac{di_L}{dt} + L_2 \frac{di_L}{dt}$$

$$v_T = v_1 + v_2$$

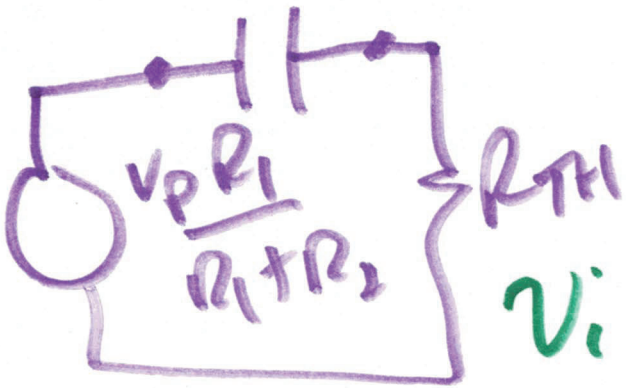


$v_i = 5$

$v_f = 0$

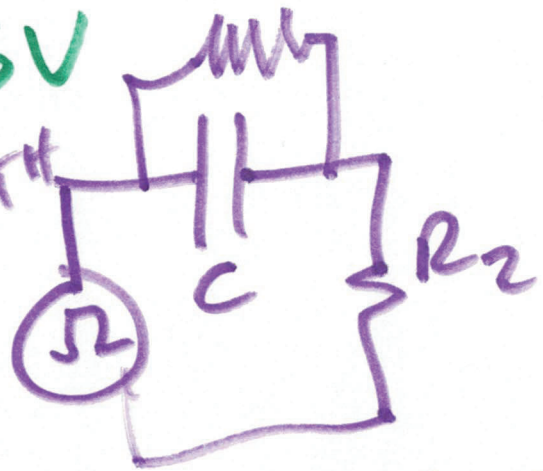
$v_{OUT}(t) = v_f + (v_i - v_f)\, e^{-t/RC}$

$= +5\, e^{-t/1-s}$

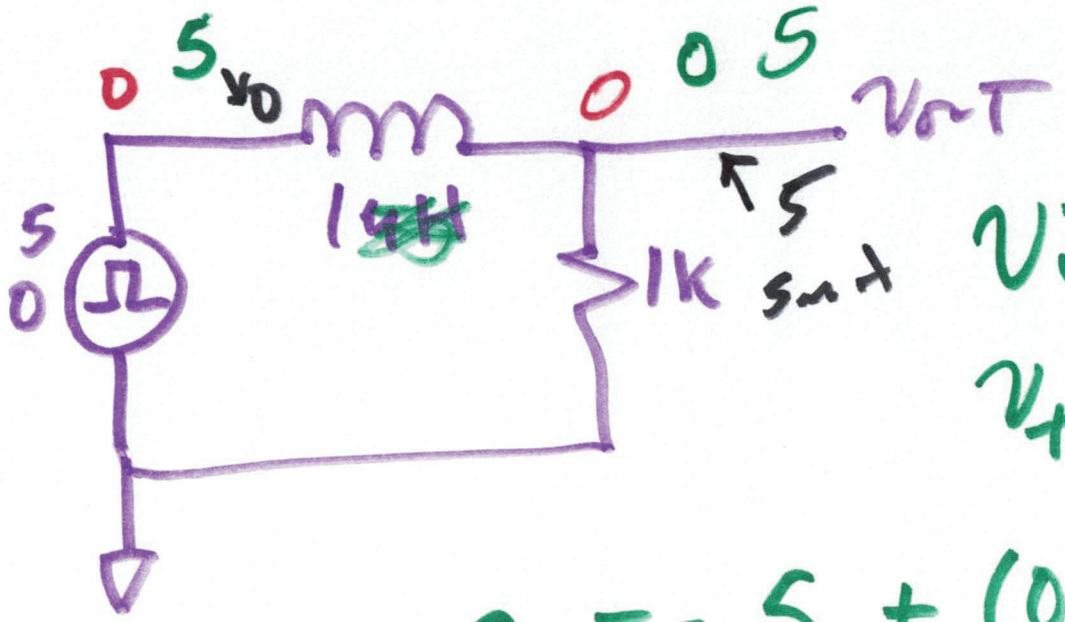


$V_P \cdot \frac{R_1}{R_1+R_2} = V_{OC} = V_{TH}$

$v_i = -5V$



$R_{TH} = R_1 \| R_2$



$\frac{L}{R} = \frac{10^{-3}}{10^{3}}$

$= 1ms$

$v_i = 0$

$v_f = 5$

$-t/\tau/R$

$v_{out} = 5 + (0-5)e$

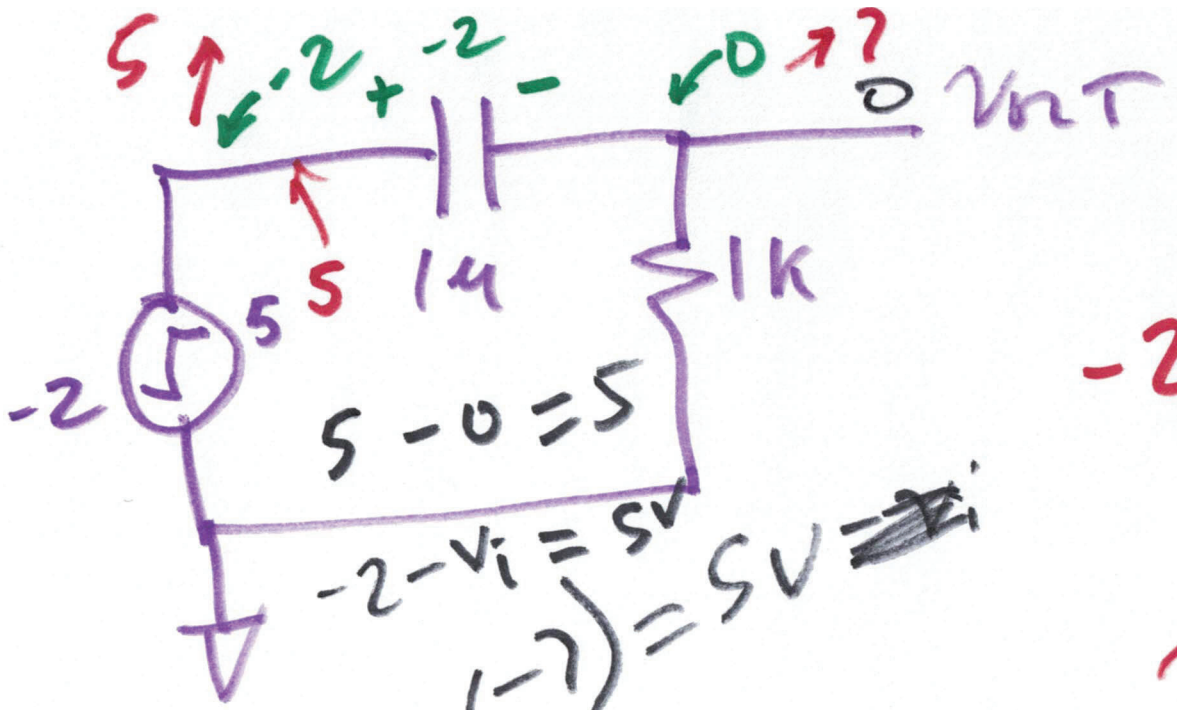
$5(1-e^{-t/1ms})$

$v_i = 5 \quad v_f = 0$

$\frac{(t-5.5ms)}{1ms}$

$v_{out} = 5e$

$t \geq 5.5ms$



$-2 = 5 - v_{out}$

$v_{out} = 7V$

$v_i = 7V$

$v_t = 0$

$v_{out} = 0 + (7-0)e^{-t/ms}$

$5 - 0 = 5V$

$-2 - v_{out} = 5V$

$v_{out} = -7V$