

EE 220 Circuits I

Lecture 18
NOVEMBER 2, 2022

$$v(t) = V_0 \cdot t$$

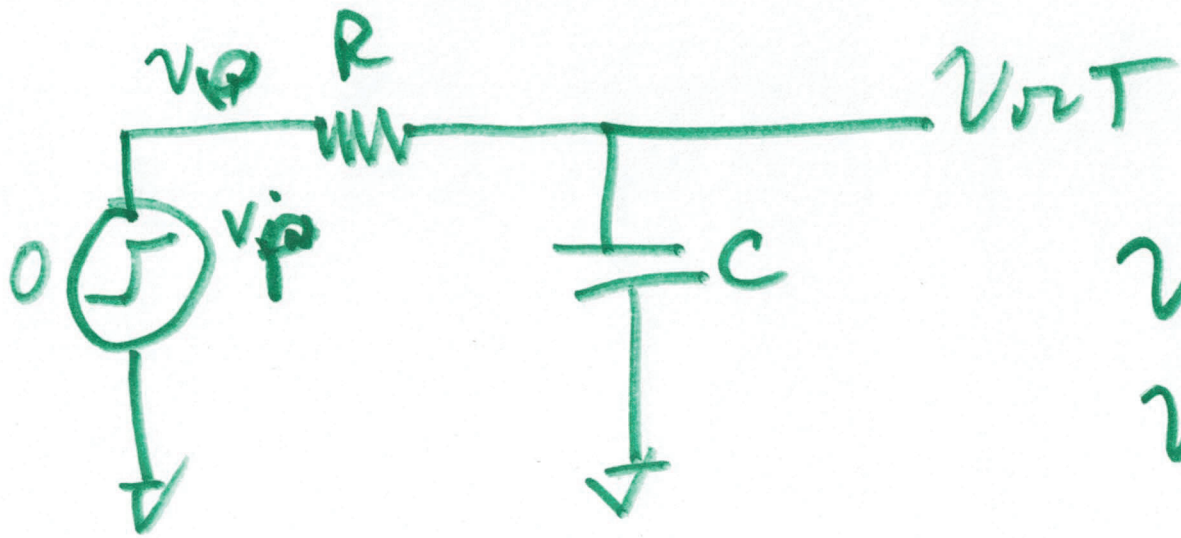
$$v = L \cdot \frac{di}{dt}$$

→

$$V_0 \cdot t = L \cdot \frac{di}{dt}$$

$$i(t) = \frac{V_0 \cdot t^2}{2L}$$

$$= \frac{V_0}{L} \int_0^t t \cdot dt = \int_0^t di = i(t) - 0$$



$$v_i = 0$$

$$v_f = v_p e^{-t/RC}$$

$$v_o(t) = v_f + (v_i - v_f)e^{-t/RC}$$

$$= v_p (1 - e^{-t/RC})$$

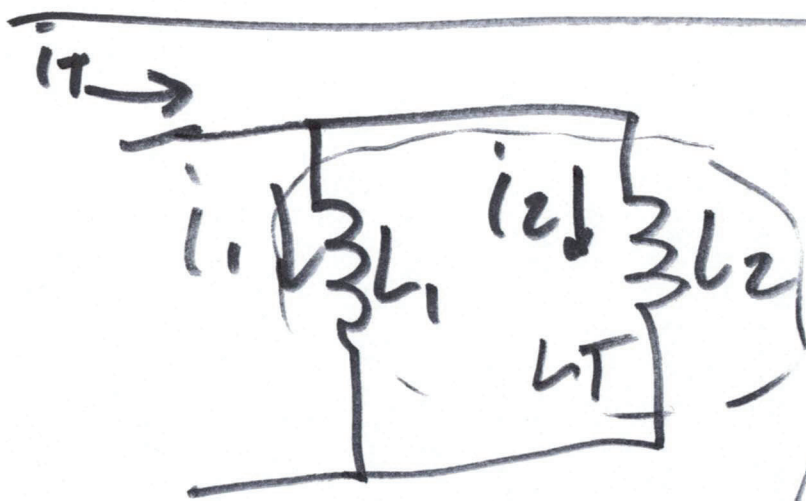
$$\frac{v_p}{2} = v_p (1 - e^{-t/RC})$$

$$-\frac{1}{2} = -e^{-t/RC}$$

$$\ln \frac{1}{2} = \ln e^{-t_d/RC}$$

$$-0.7 = \frac{-t_d}{RC}$$

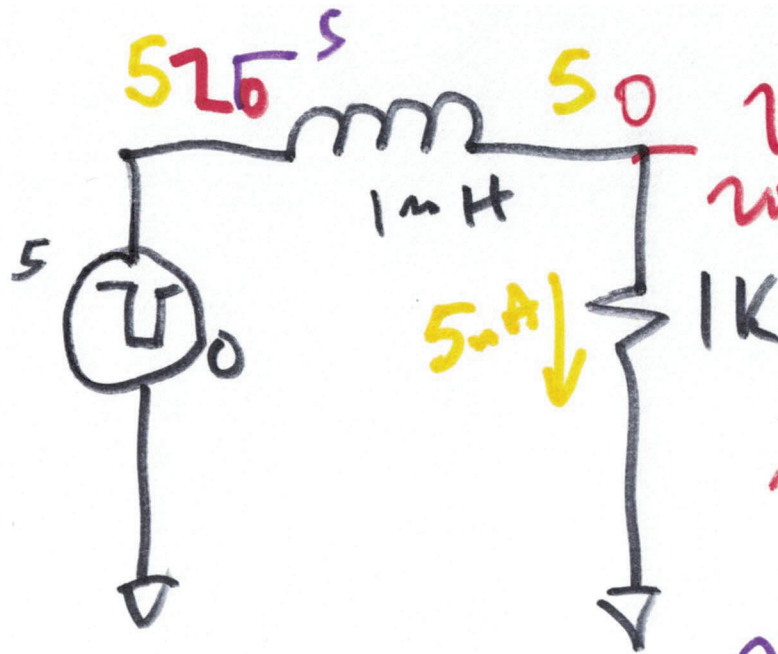
$$t_d = 0.7RC$$



$$\frac{1}{L_T} \int i_T dt =$$

$$\frac{1}{L_1} \int i_1 dt + \frac{1}{L_2} \int i_2 dt$$

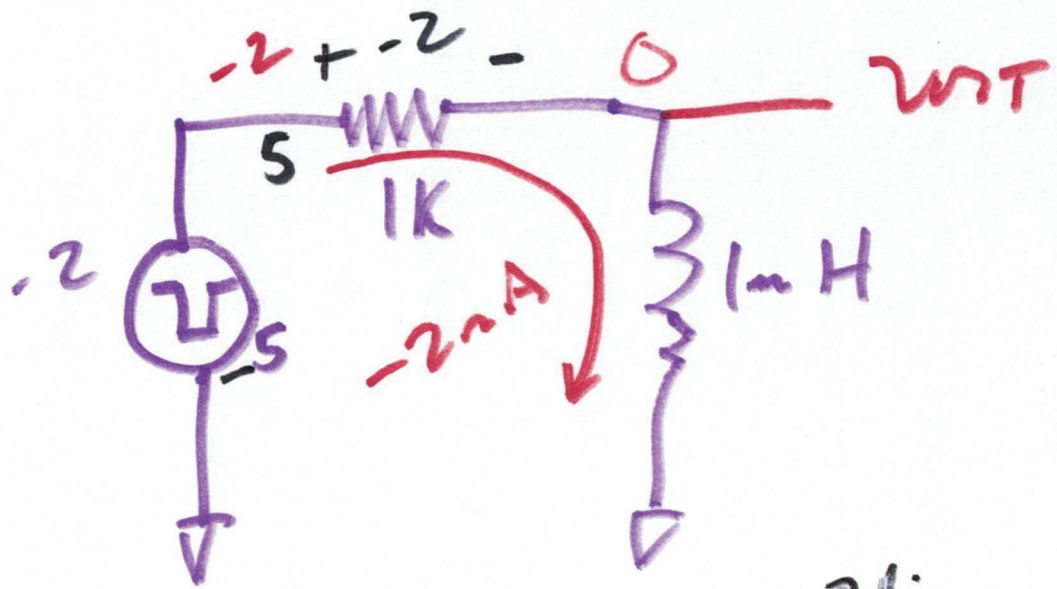
$$i_T = i_1 + i_2$$



$v_i = 5$
 $v_{out} = 0$
 $v_f + (v_i - v_f) e^{-t/\tau}$
 $v_{out} = 5 e^{-t/4\mu s}$

$v_i = 0$
 $v_f = 5$
 $v_{out} = 5 (1 - e^{-t/4\mu s})$

4)



$$v_i$$

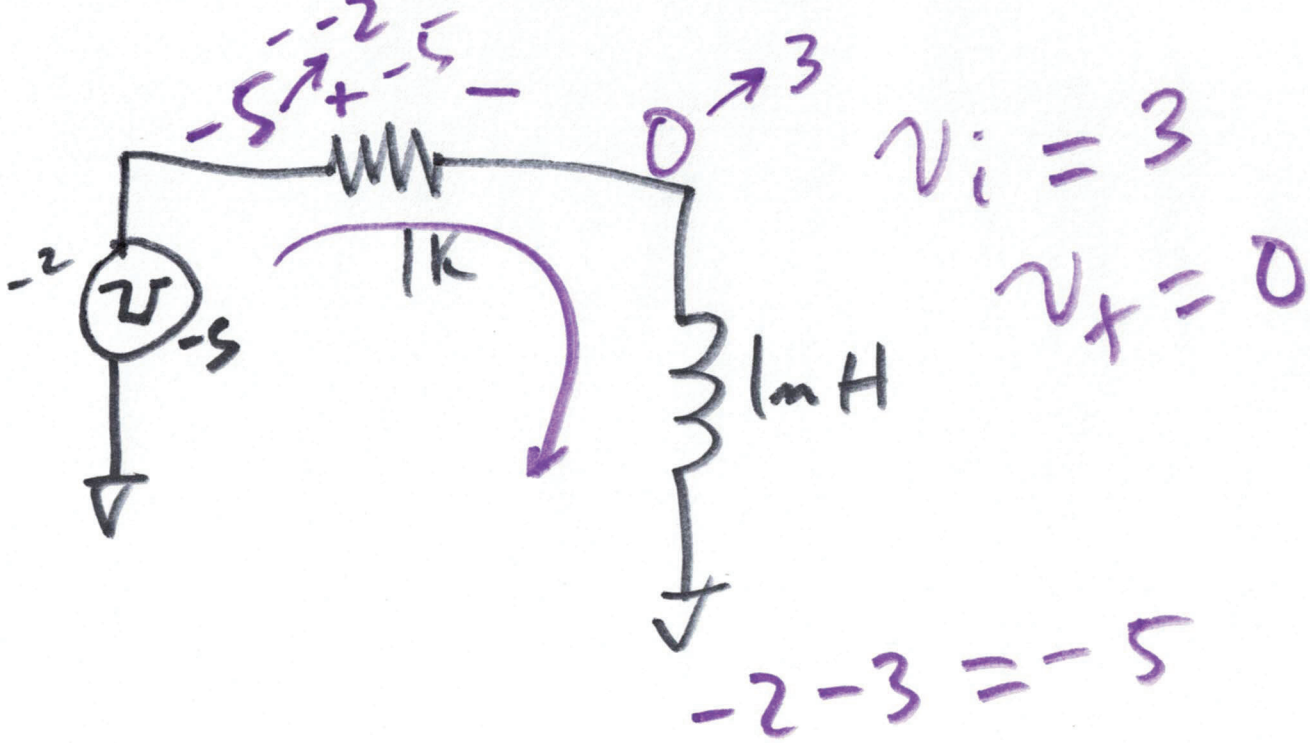
$$5 - V_{out} = -2$$

$$V_{out} = 7V = v_i$$

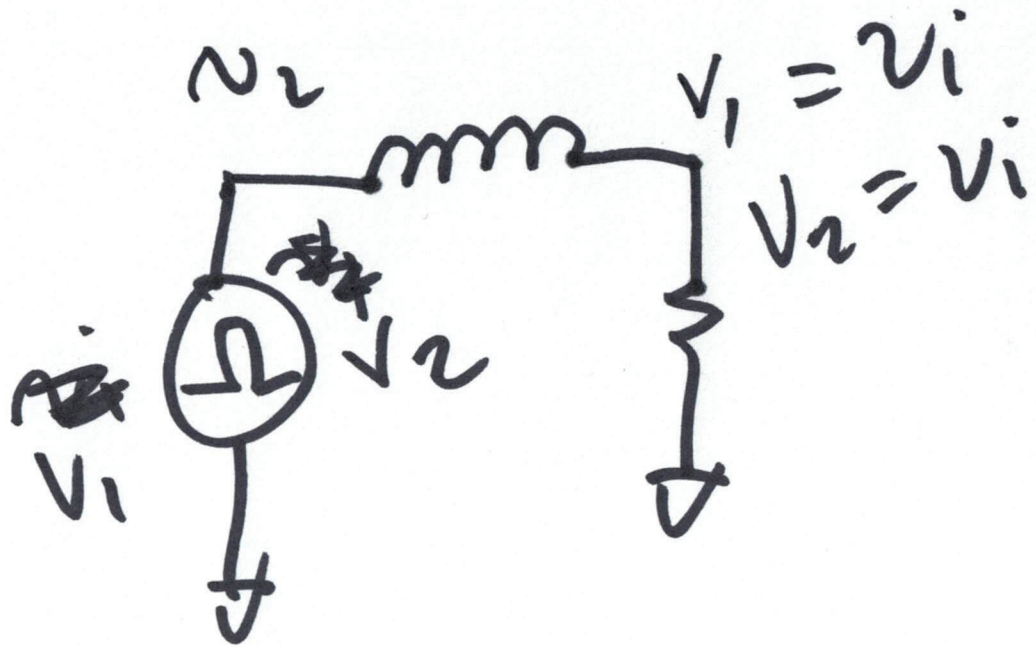
$$v_f =$$

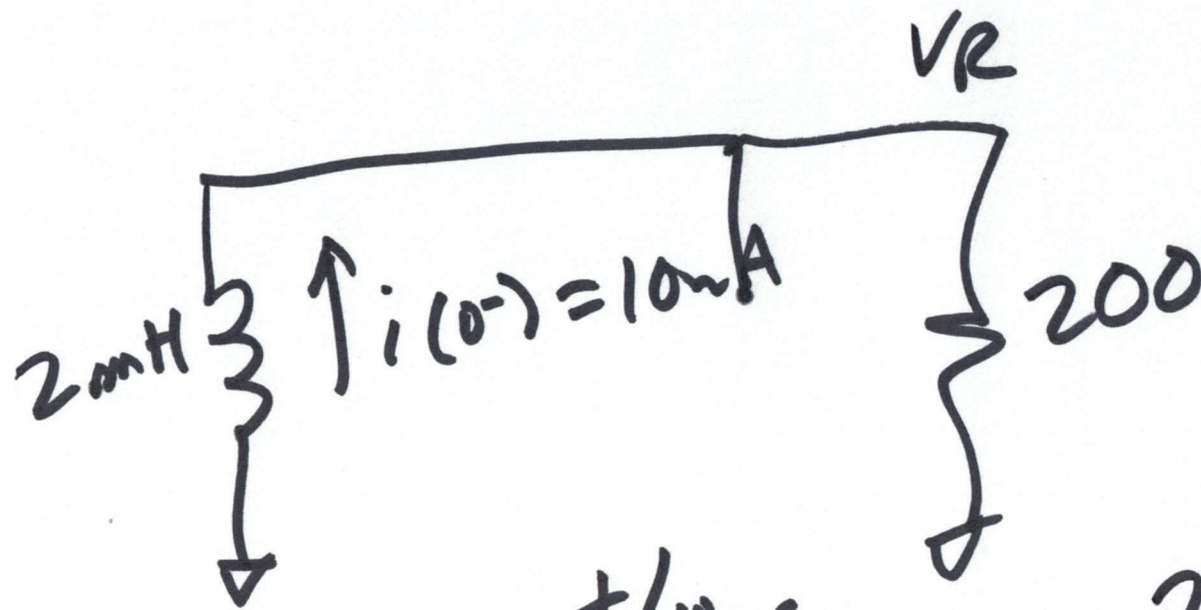
$$-5 - V_{out} = -2$$

$$V_{out} = -3$$



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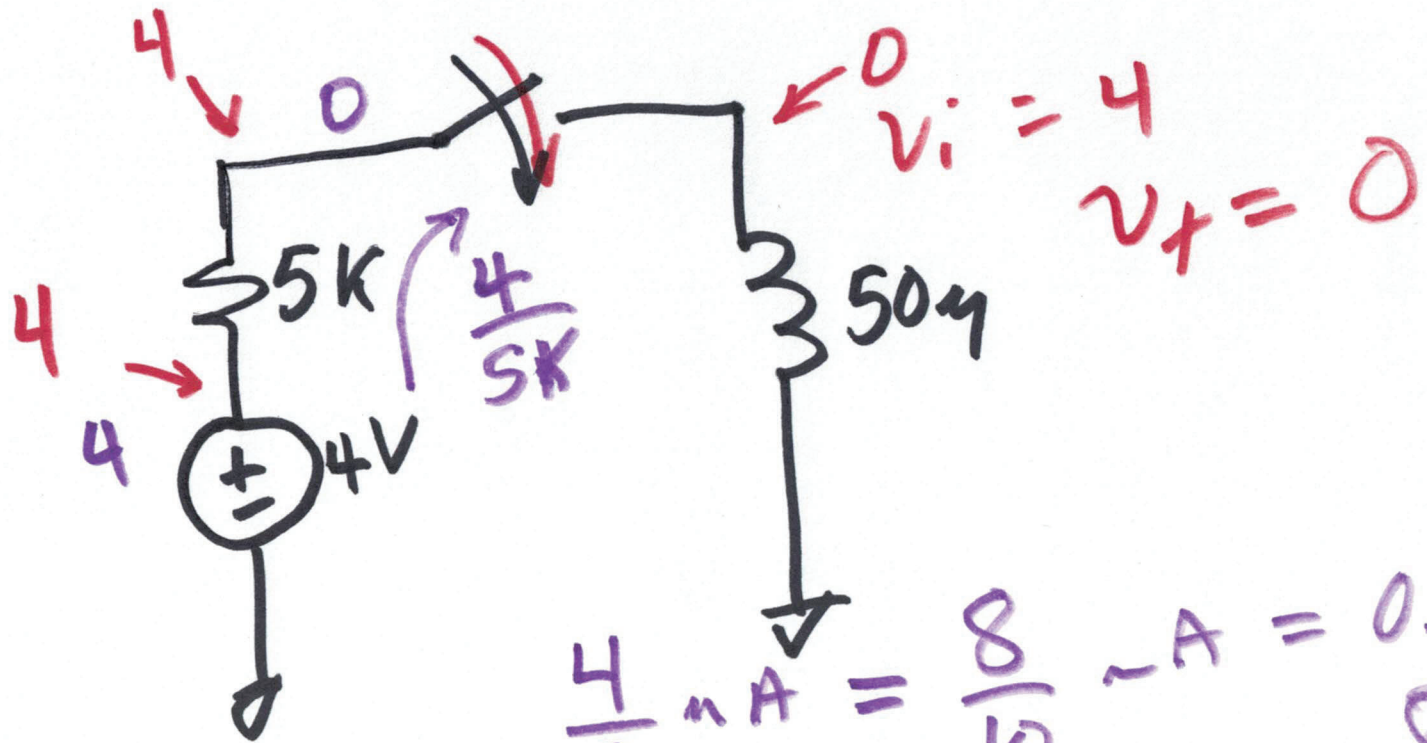
$$\tau = \frac{2 \times 10^{-3}}{2 \times 10^{+2}} = 10^{-5} = 10\ \mu\text{s}$$

$$-t/10\ \mu\text{s}$$

$$v_R(t) = 2e^{-t/10\ \mu\text{s}}$$

$$v_i = 200 \cdot 10\text{mA} = 2\text{V}$$

$$v_f = 0$$



$\frac{4}{5} \text{ nA} = \frac{8}{10} \text{ nA} = 0.8 \text{ nA} = 800 \text{ pA}$

$\tau = \frac{50 \mu}{5 \text{ k}} = 10 \cdot \frac{10^{-6}}{10^3} = 10 \text{ ns}$

