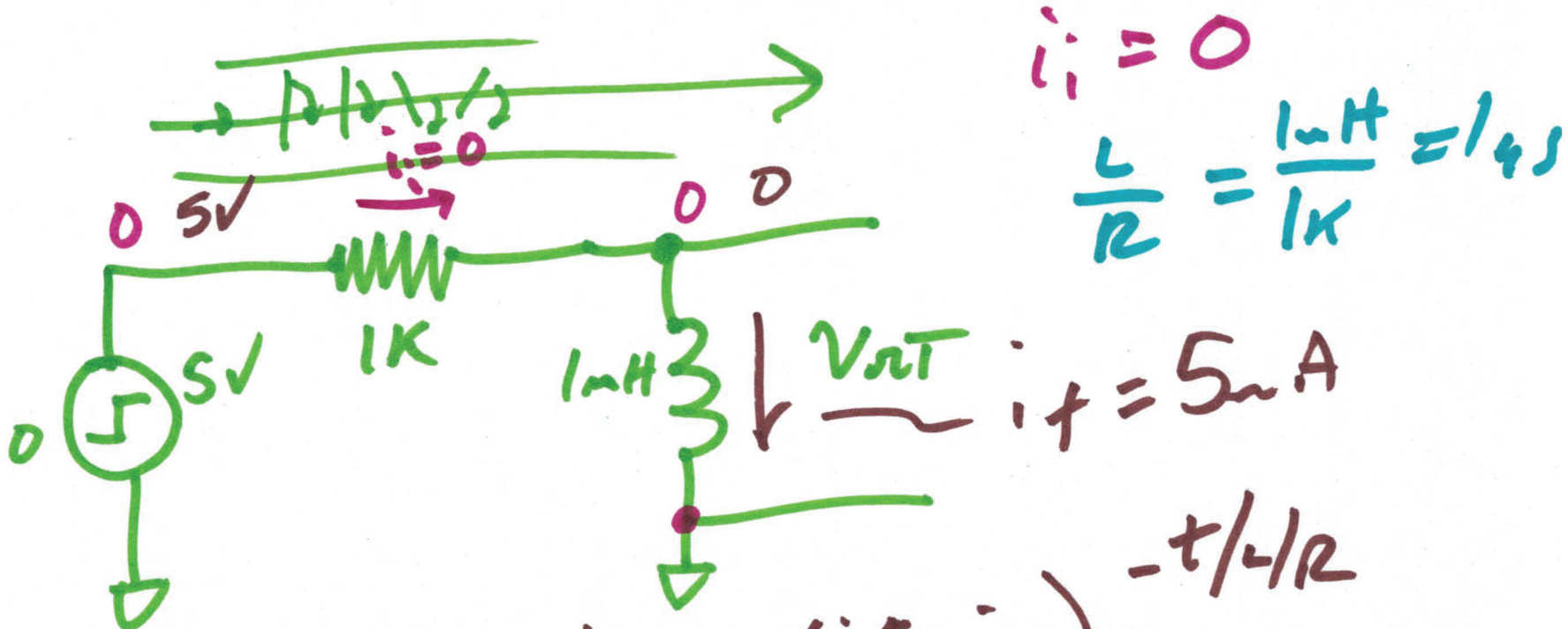


EE 221 circuits II

Lecture 15

MARCH 24, 2021



$$i_L(t) = i_f + (i_i^* - i_f) e^{-t/\tau/R}$$

$$= 5\text{mA} (1 - e^{-t/4\mu\text{s}})$$

$$i_i = 0$$

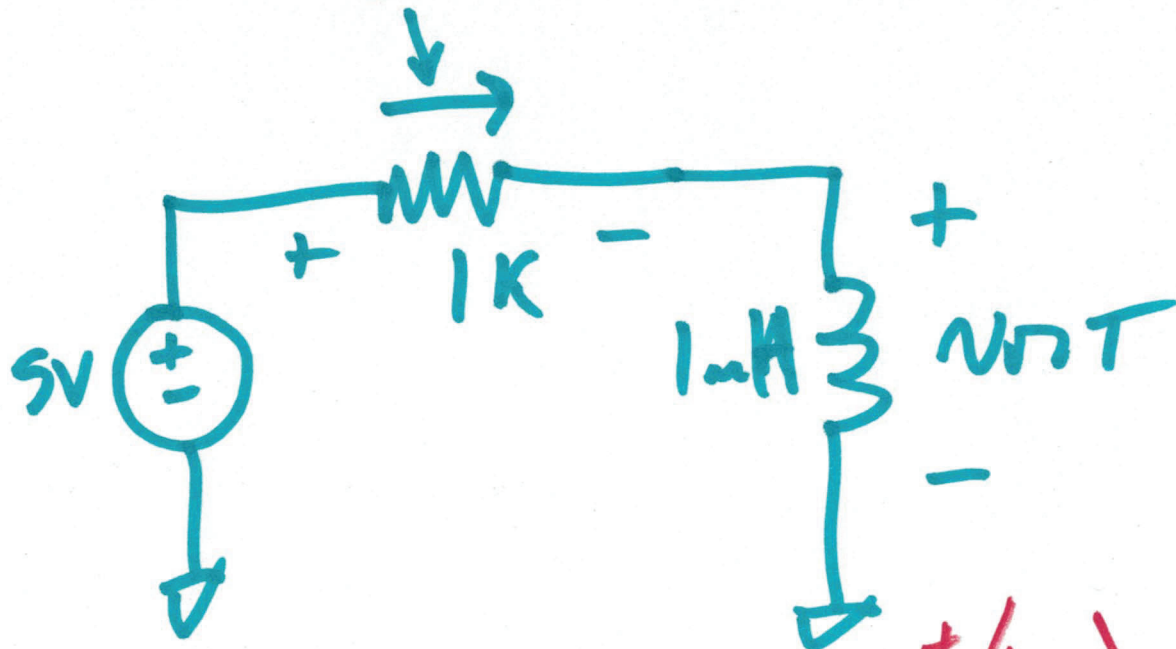
$$\tau/R = \frac{1\text{mH}}{1\text{k}} = 1\mu\text{s}$$

$$i_f = 5\text{mA}$$

$$-t/\tau/R$$

1)

$$i_L(t) = 5\text{mA} (1 - e^{-t/1\mu\text{s}})$$



$$5 - 1\text{k} \cdot 5\text{mA} (1 - e^{-t/1\mu\text{s}}) - V_{\text{out}} = 0$$

$$V_{\text{out}} = 5 - 5 + 5e^{-t/1\mu\text{s}}$$

$$V_{\text{out}} = 5e^{-t/1\mu\text{s}}$$

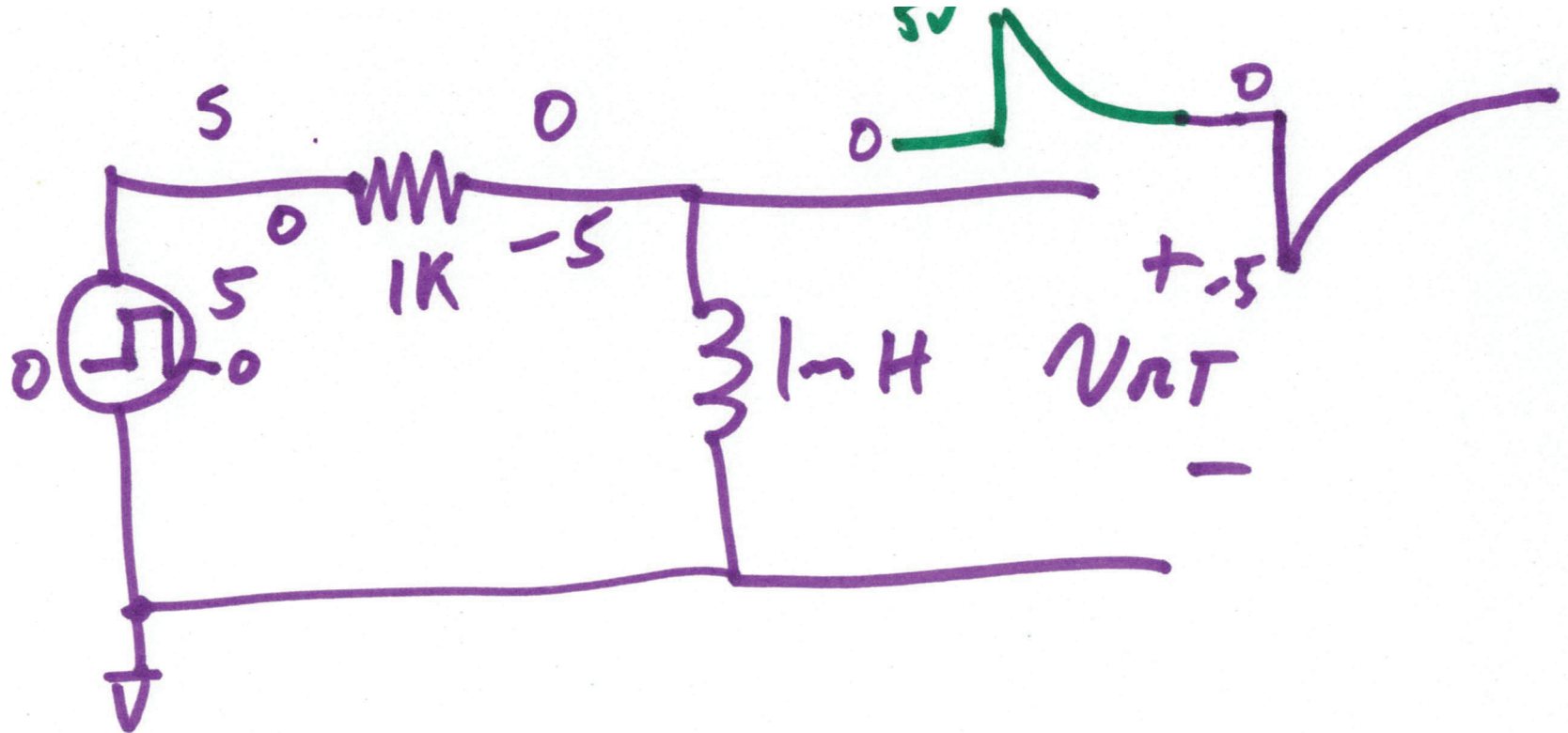
$$i_L(t) \begin{cases} 1 \mu\text{H} \\ 3 \end{cases} v_{LT} = L \cdot \frac{di}{dt} = 1 \mu\text{H} \frac{d}{dt} (5 \text{mA} - 5 \text{mA} e^{-t/1 \mu\text{s}})$$

$$\rightarrow 5 \text{mA} (1 - e^{-t/1 \mu\text{s}}) = \frac{(1 \mu\text{H})(-5 \text{mA}) e^{-t/1 \mu\text{s}}}{-1 \mu\text{s}}$$

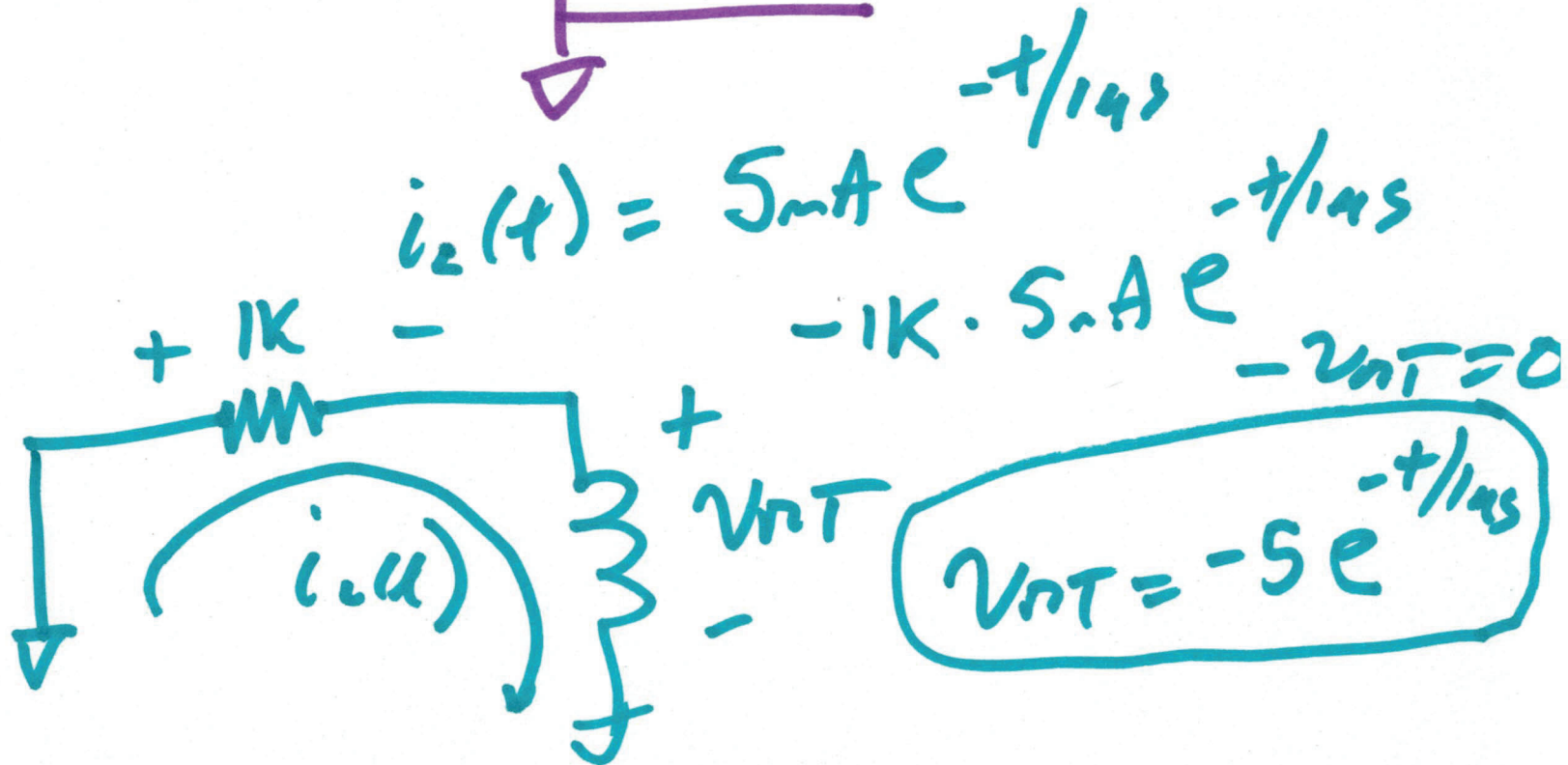
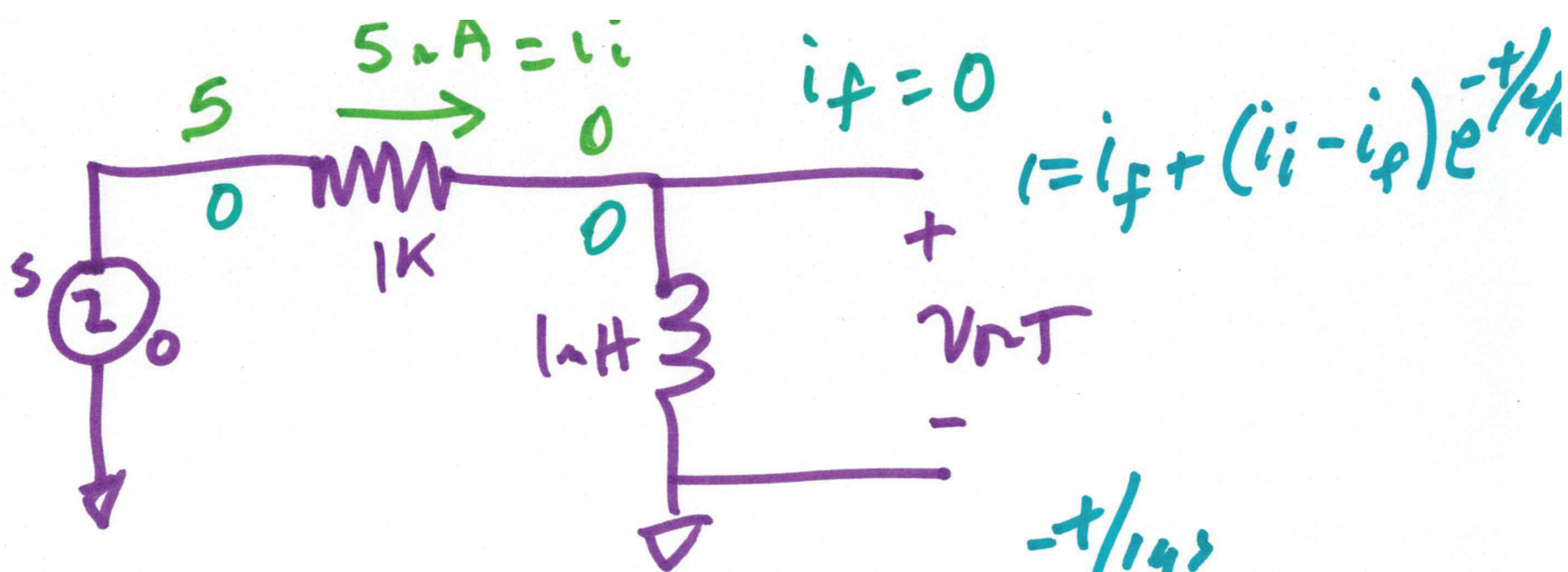
$$\frac{d}{dx} e^{-x/a} = e^{-x/a} \cdot \frac{d(-x/a)}{dx} = -\frac{1}{a} \frac{dx}{dx}$$

$$\rightarrow v_{LT} = 5 e^{-t/1 \mu\text{s}}$$

3)



4)

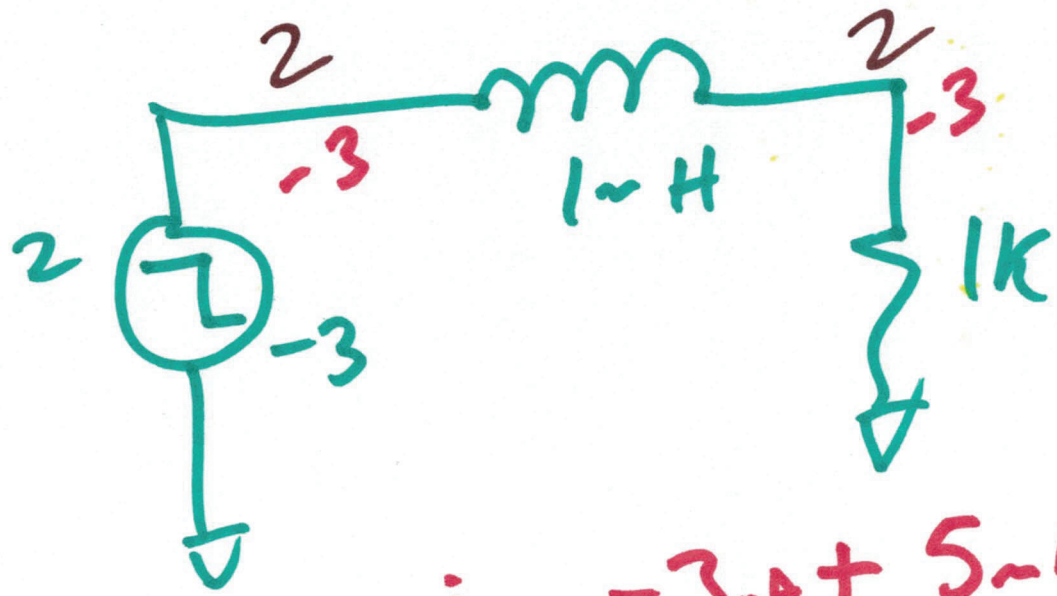


5)

$i_L \downarrow$
 1mH $\left\{ \begin{array}{l} + \\ - \end{array} \right.$ $2\text{mT} = L \cdot \frac{di}{dt} = 1\text{mH} \cdot \frac{d(5e^{-t/1\mu\text{s}})}{dt}$
 \downarrow

$$= 1\text{mH} \cdot (5\text{mA}) \cdot e^{-t/1\mu\text{s}} \cdot \left(-\frac{1}{1\mu\text{s}}\right)$$

$$\frac{d}{dx} 7^{\frac{-x}{4}} = \ln 7 \cdot 7^{\frac{-x}{4}} \cdot \left(-\frac{1}{4}\right) = -\frac{1}{4} \ln 7 \cdot 7^{\frac{-x}{4}}$$



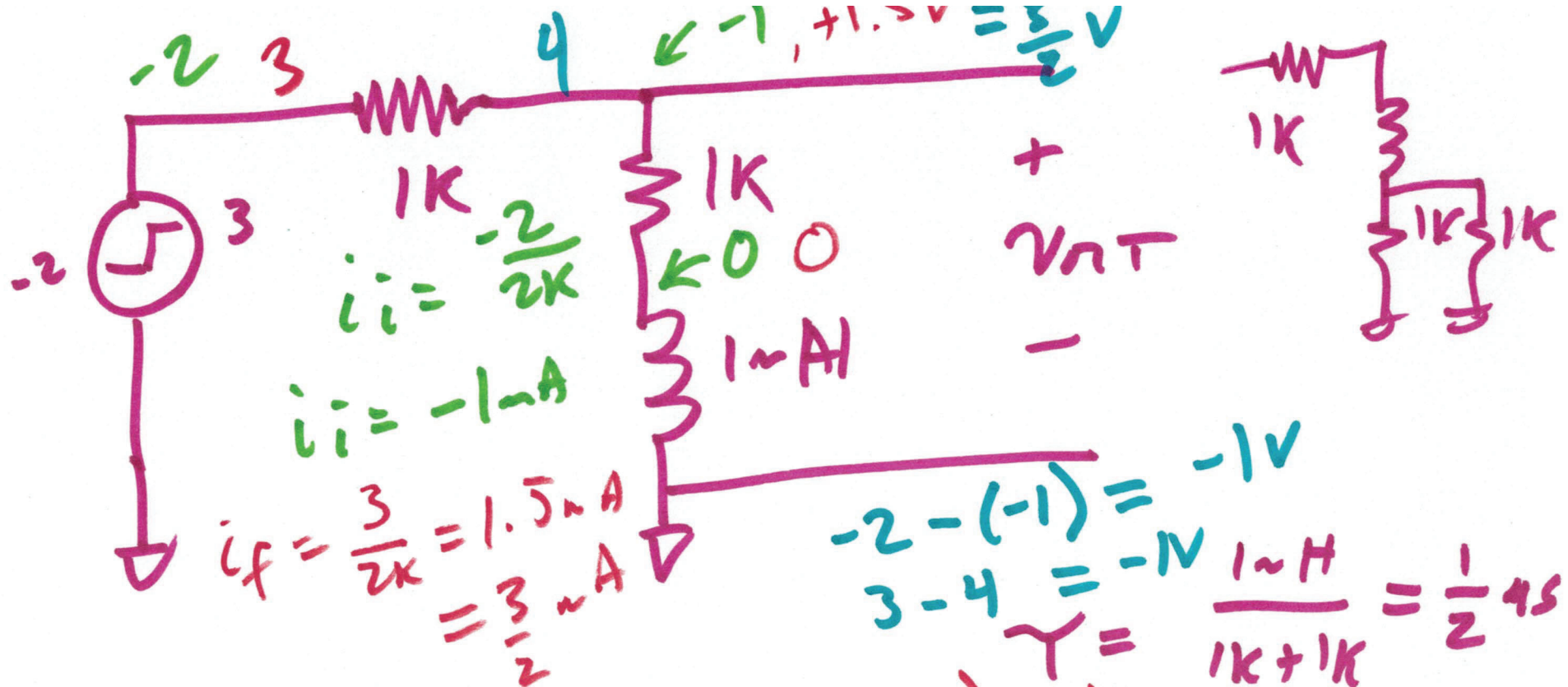
$$i_i = 2 \text{ A}$$

$$i_f = -3 \text{ mA}$$

$$i = -3 \text{ mA} + 5 \text{ mA} e^{-t/1 \mu\text{s}}$$

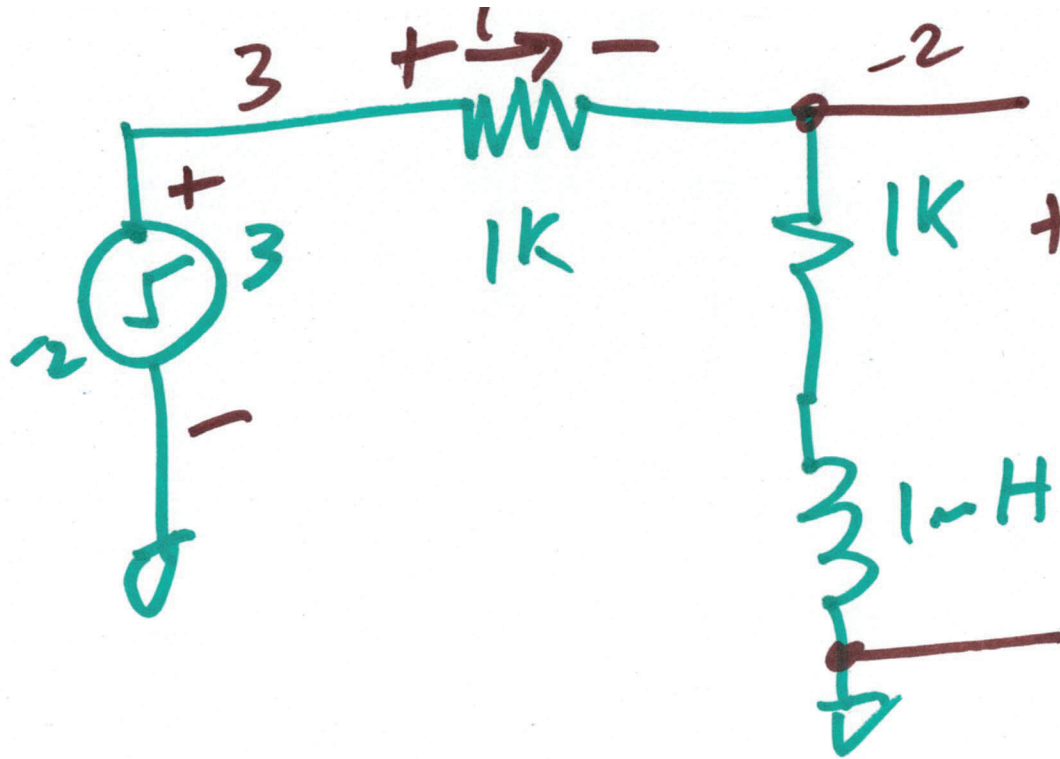
$$1 \text{ k} \cdot i = v_{RT} = -3 + 5 e^{-t/1 \mu\text{s}}$$





$$i = \frac{3}{2} \mu A + \left(-1 \mu A - \frac{3}{2} \mu A \right) e^{-t/\tau}$$

$$= i_f + (i_i - i_f) e^{-t/\tau}$$

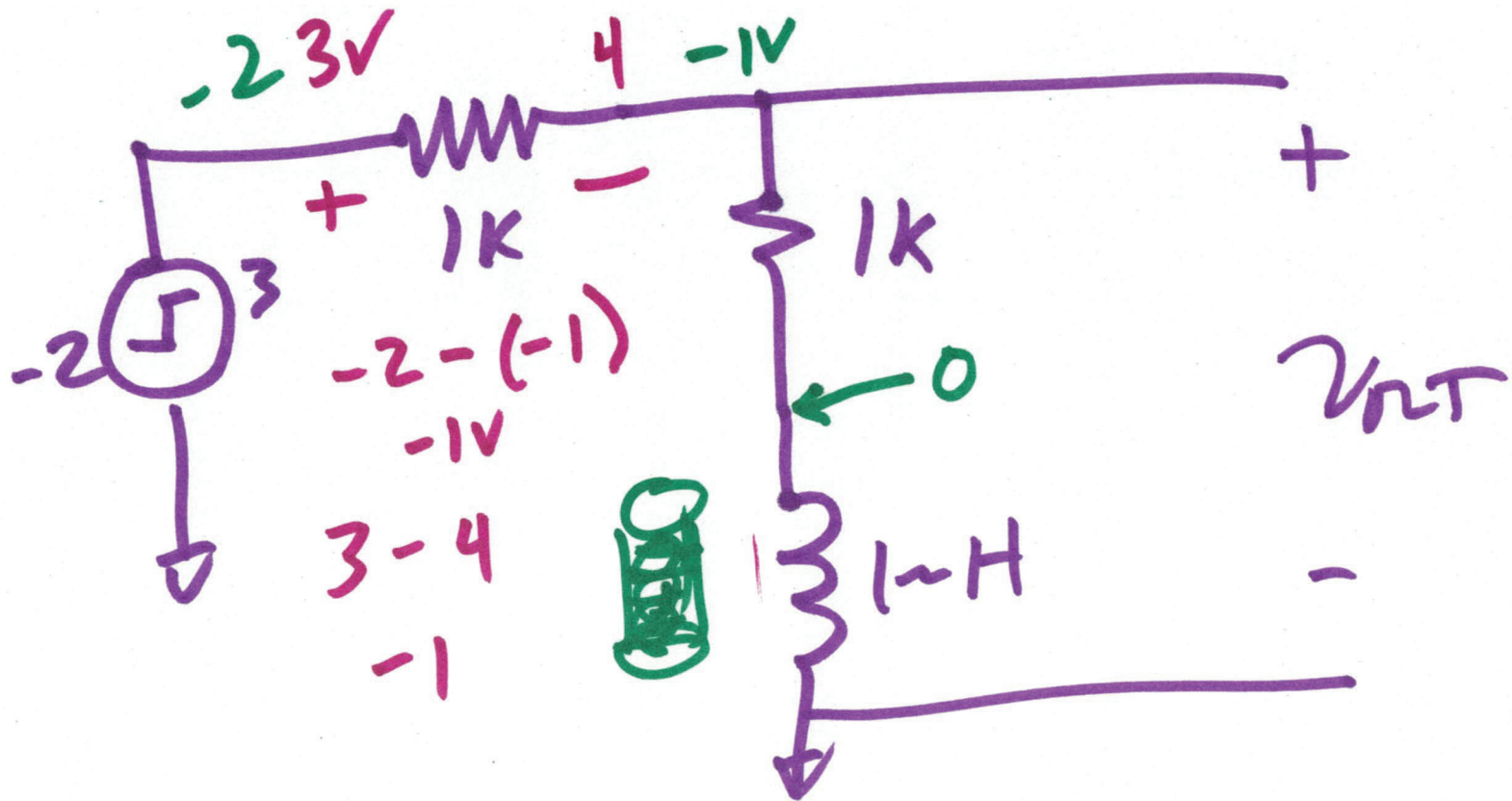


$$i = \frac{3}{2} \mu\text{A} - \frac{5}{2} \mu\text{A} e^{-\frac{t}{\tau}}$$

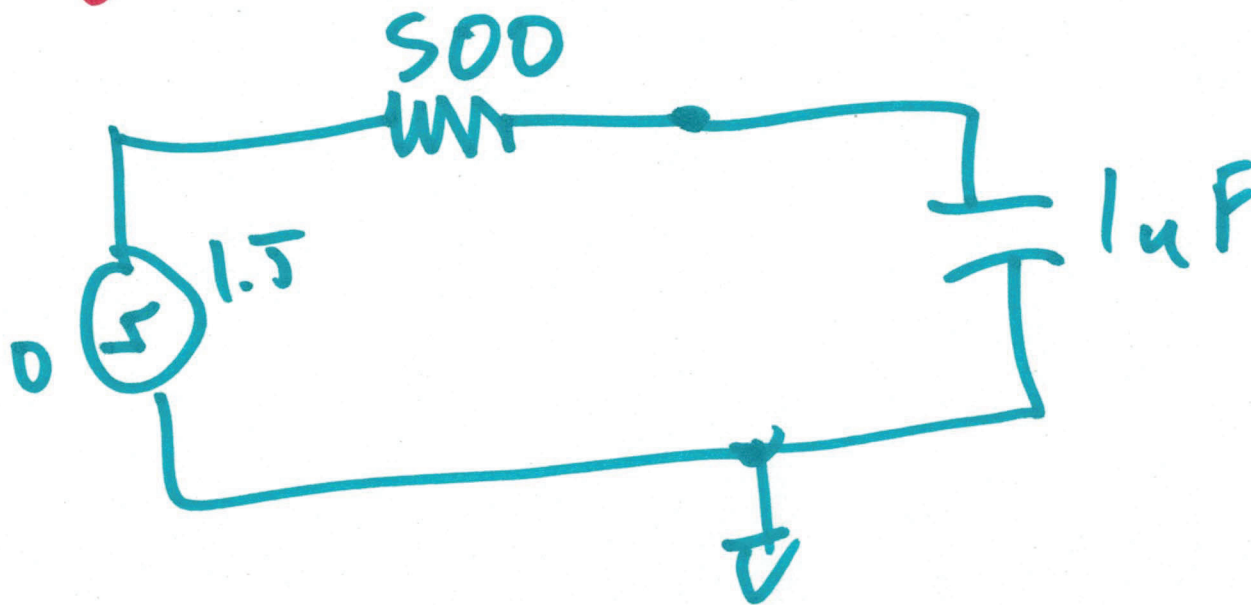
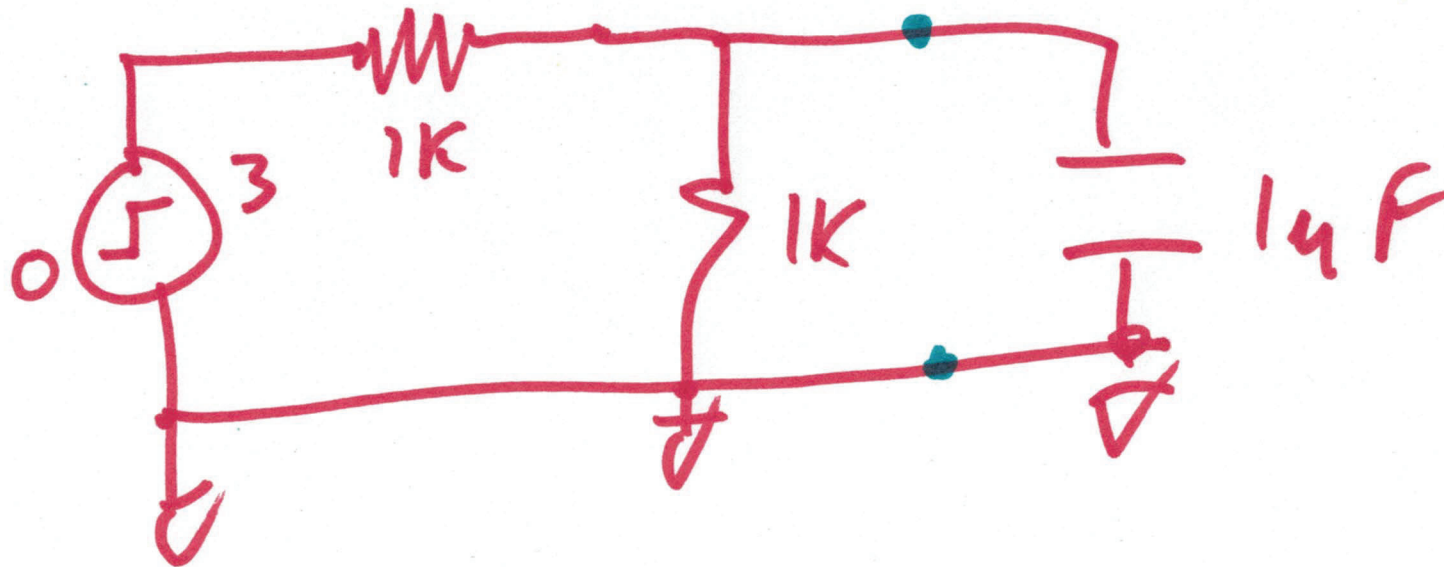
$$v_{mT} = 3 - i \cdot 1k$$

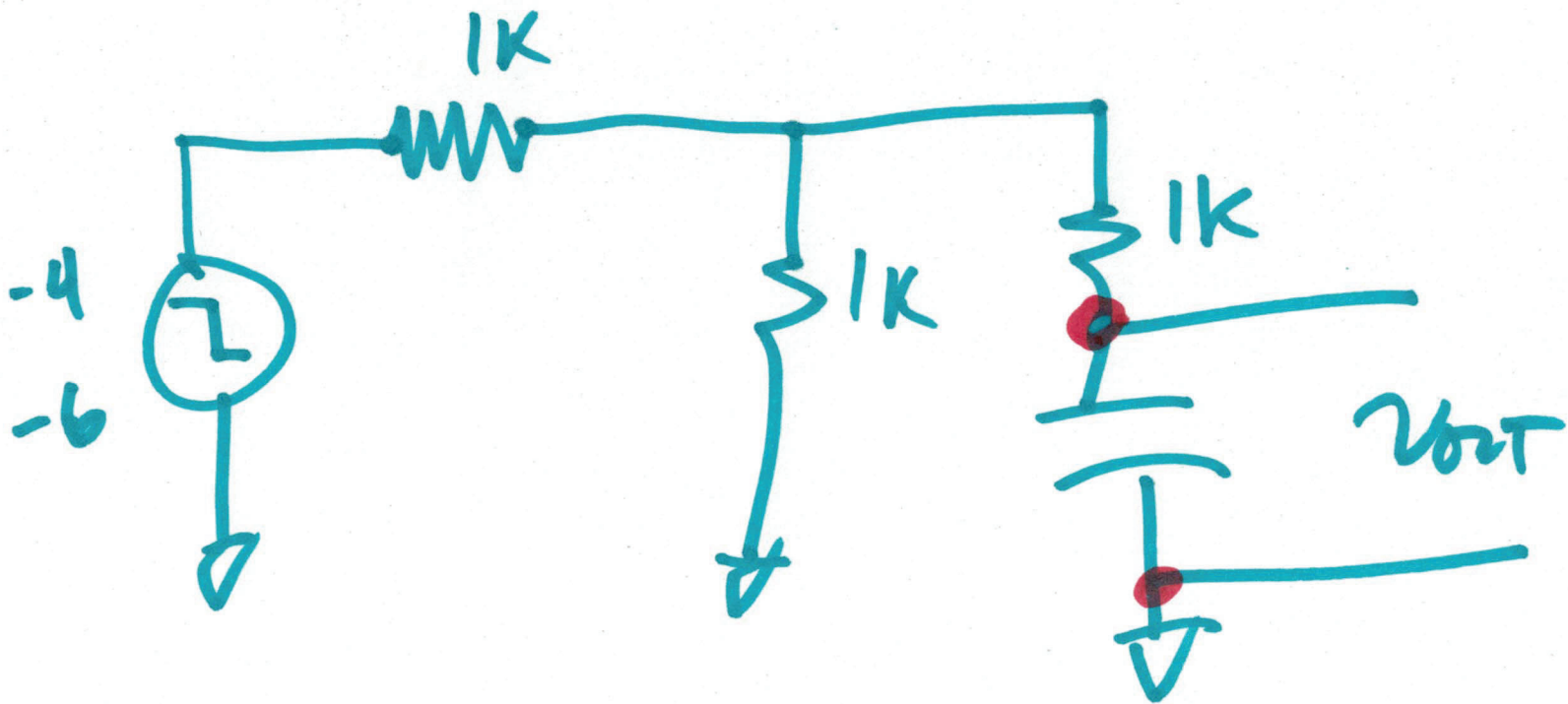
$$= 3 - \left(\frac{3}{2} - \frac{5}{2} e^{-\frac{t}{\tau}} \right) \cdot 1k$$

$$= \frac{3}{2} + \frac{5}{2} e^{-\frac{t}{\tau}}$$



10)





$R_{TH} = 1.5K$

good teaching ü



12)

