EE 220 Circuits 1

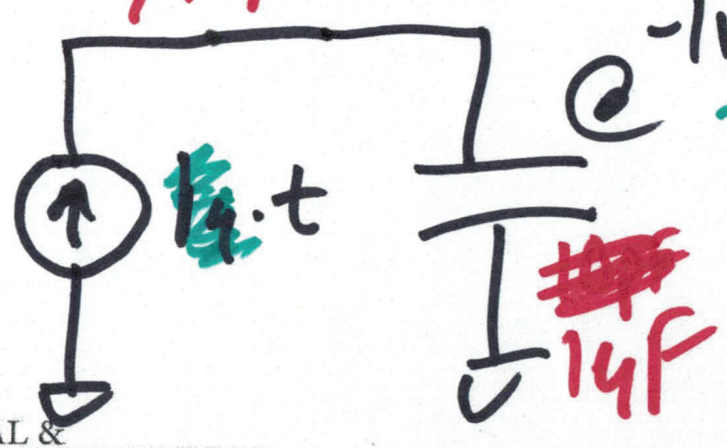
October 26, 2020

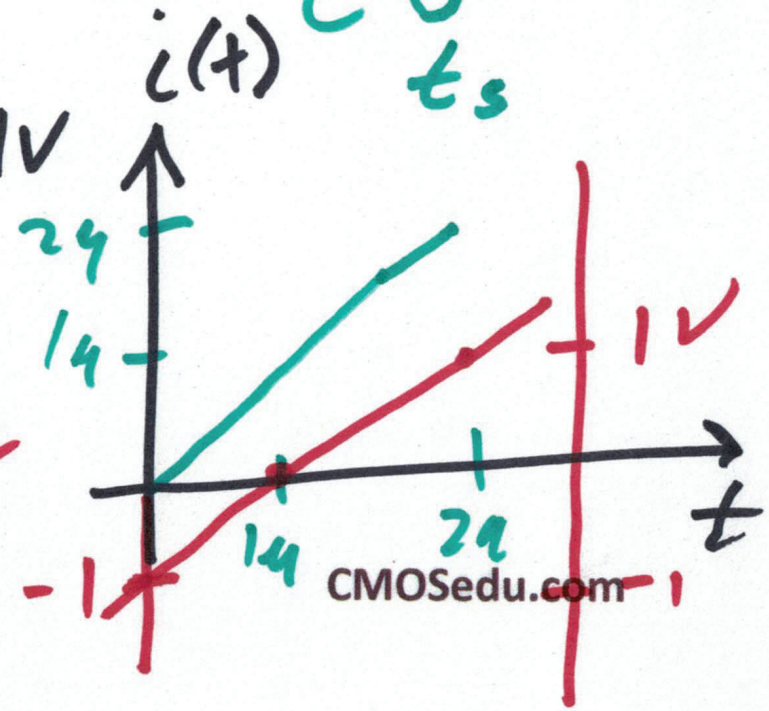
Lecture 17

$$I = C\frac{dv_c}{dt}$$

$$V_c(t) = v_{initial} + \frac{1}{C}\int_{t_s}^{t} i(t)\cdot dt$$

$$v_c(t) = -1 + \frac{t}{10}$$





$$v_c(t) = -1 + \frac{1}{1F}\int_0^t t\,dt$$

$$= -1 + \frac{1}{2}\frac{t^2}{1F}$$

$$1F$$

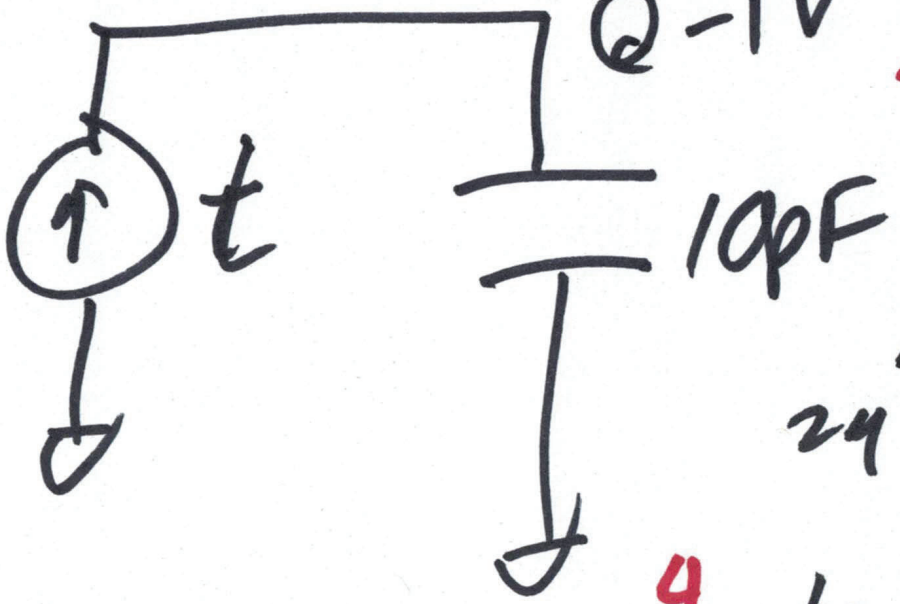
wrong!!

do it again

2)

$$v_1(t) = -1 + \frac{1}{10pF}\int_0^t t\,dt$$

-1 ← Q $-1V$



$$v_1(t) = -1 + \frac{1}{2}\cdot\frac{1}{10p}\cdot t^2$$

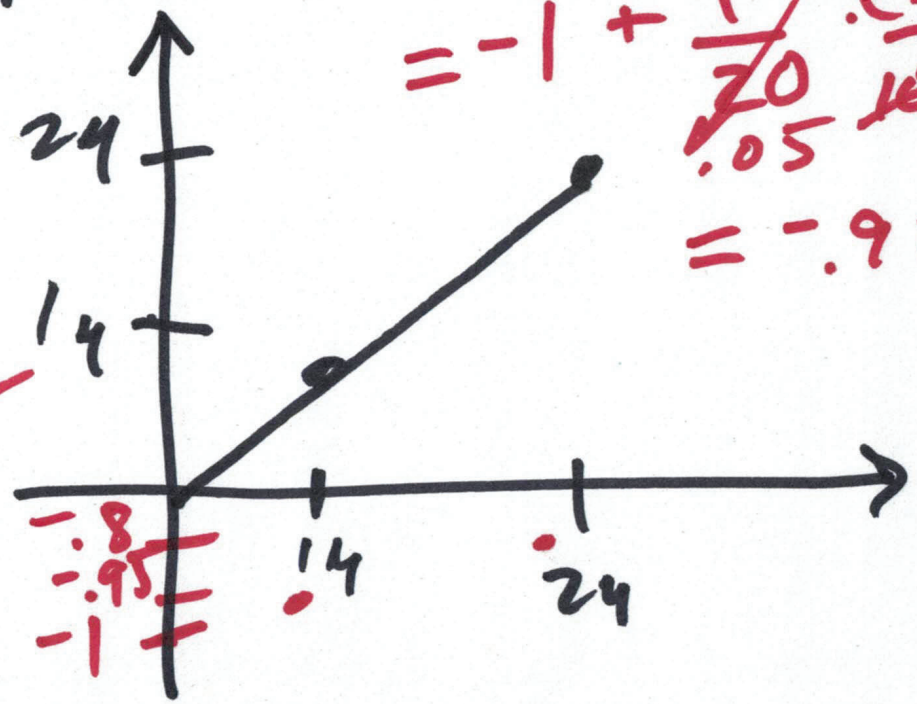
$t = 1s$

$= -1 + \frac{1}{20}\cdot(10^2)$

$10\cdot 10$

$.05$

$= -.95$



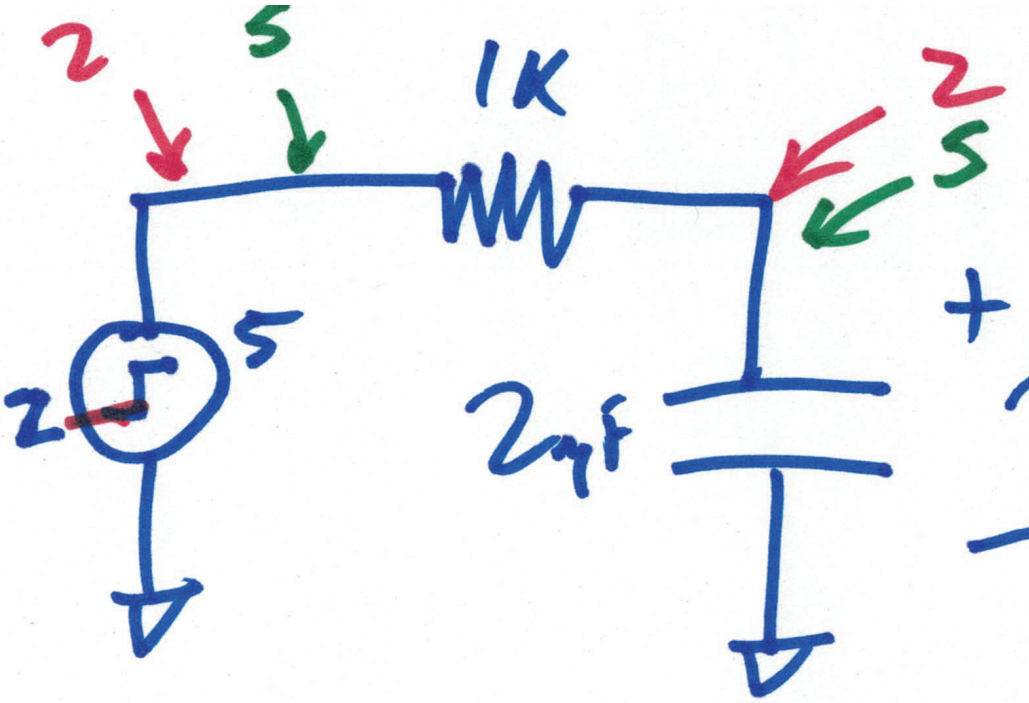
$t = 2s$

$v_1(t) = -1 + \frac{1}{20}(10^2)$

$10 - 1$

$-1 + \frac{1}{5}$

5)

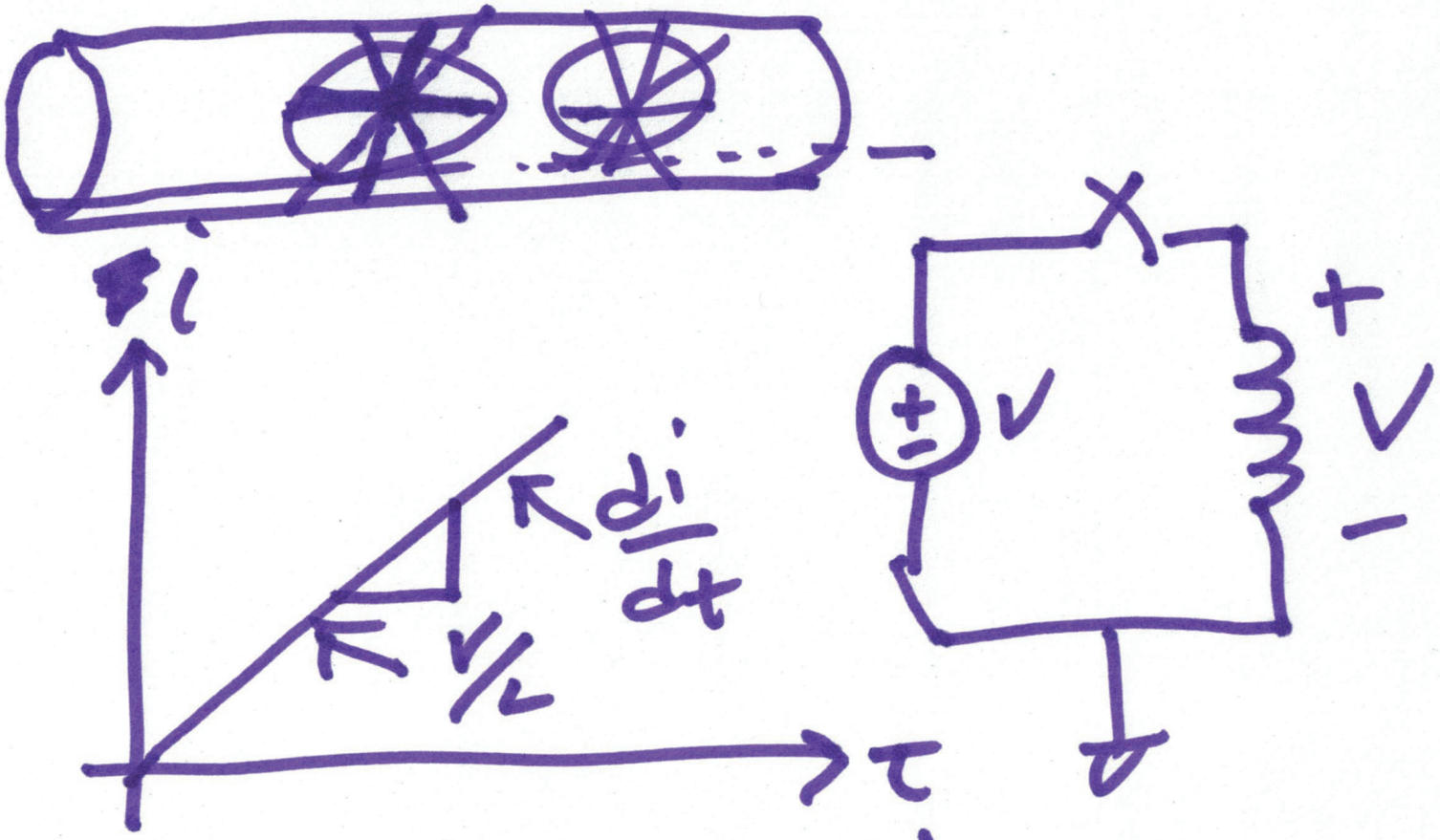


$v_i = 2$

$v_f = 5V$

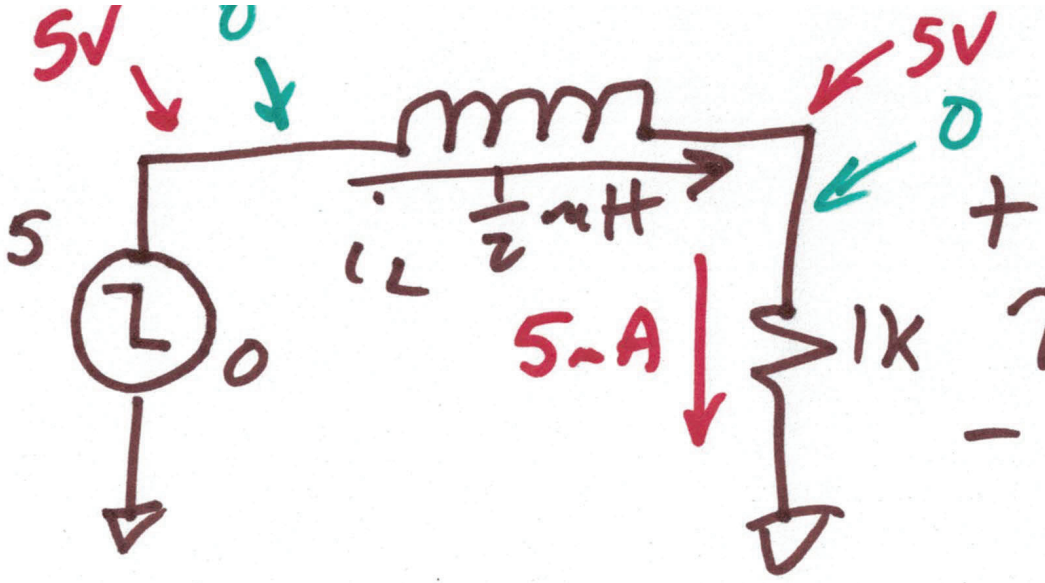
$$v_c(t) = 5 + (2-5)e^{-(t-1\text{-}s)/2\text{m}s}$$

$$t \geq 1\text{-}s$$



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

$$i_L(t) = i_i + \frac{1}{L}\int_0^t V_L(t) \cdot dt$$



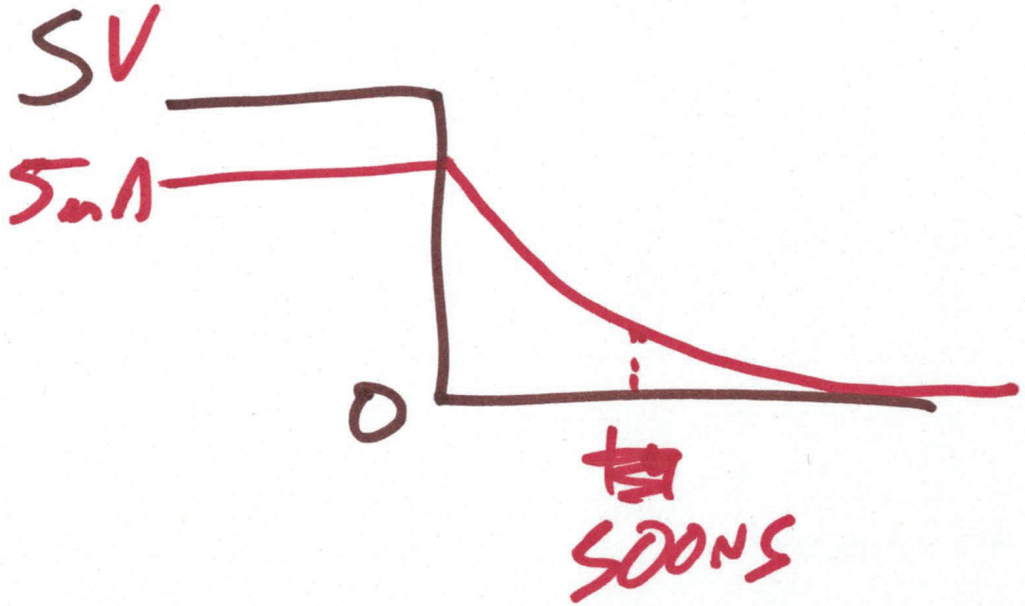
$i_i = 5\,mA$

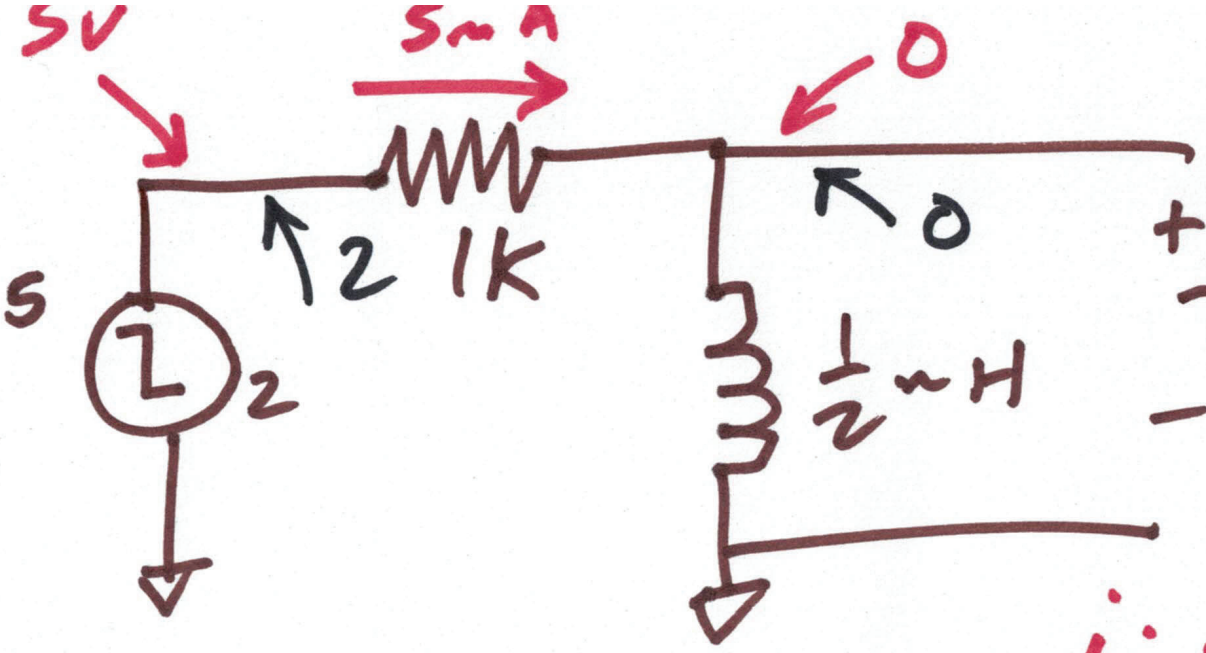
$i_f = 0$

$\frac{1}{2} \cdot \frac{10^{-3}}{10^3}$

$\tau/R = \frac{\frac{1}{2}\,mH}{1K} = 500\,ns$

$i_L(t) = 0 + (5\,mA - 0)e^{-t/500ns}$





$\frac{1}{2}\frac{10^{-3}}{10^{3}} = \frac{1}{2}10^{-6}$

$\frac{\frac{1}{2}mH}{1K} = 500ns = \frac{1}{2}\mu s$

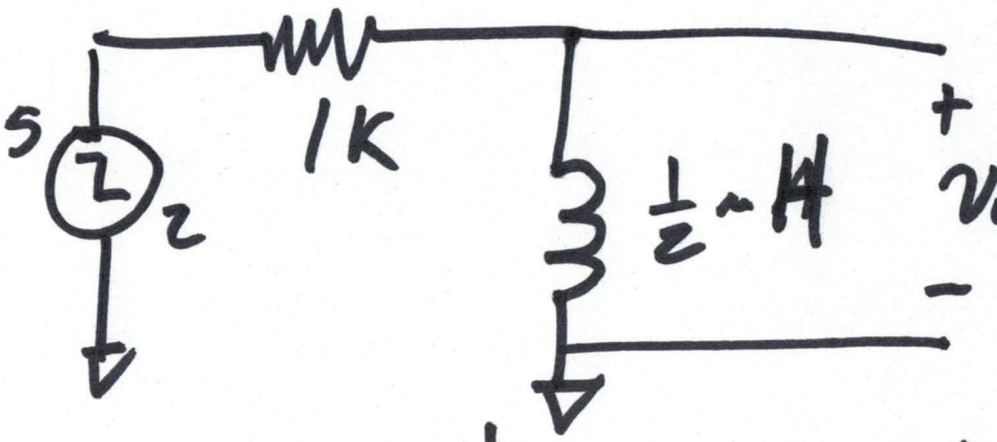
$i_i = 5mA$

$i_f = 2mA$

$i_L = 2mA + (5mA - 2mA)e^{-t/500ns}$

$2mA + 3mAe^{-t/500ns}$

mA



$$i_L = 2 - A + 3 \sim A e^{-t/500n}$$

$$v_L = L \frac{di_L}{dt}$$

$$\frac{d A e^{-x \cdot b}}{dx} = A \frac{d e^{-x \cdot b}}{dx}$$

$$v_L = \frac{1}{2} \cdot 10^{-3} H \bullet$$

$$= A \cdot e^{-xb} \cdot \frac{d(-x \cdot b)}{dx}$$

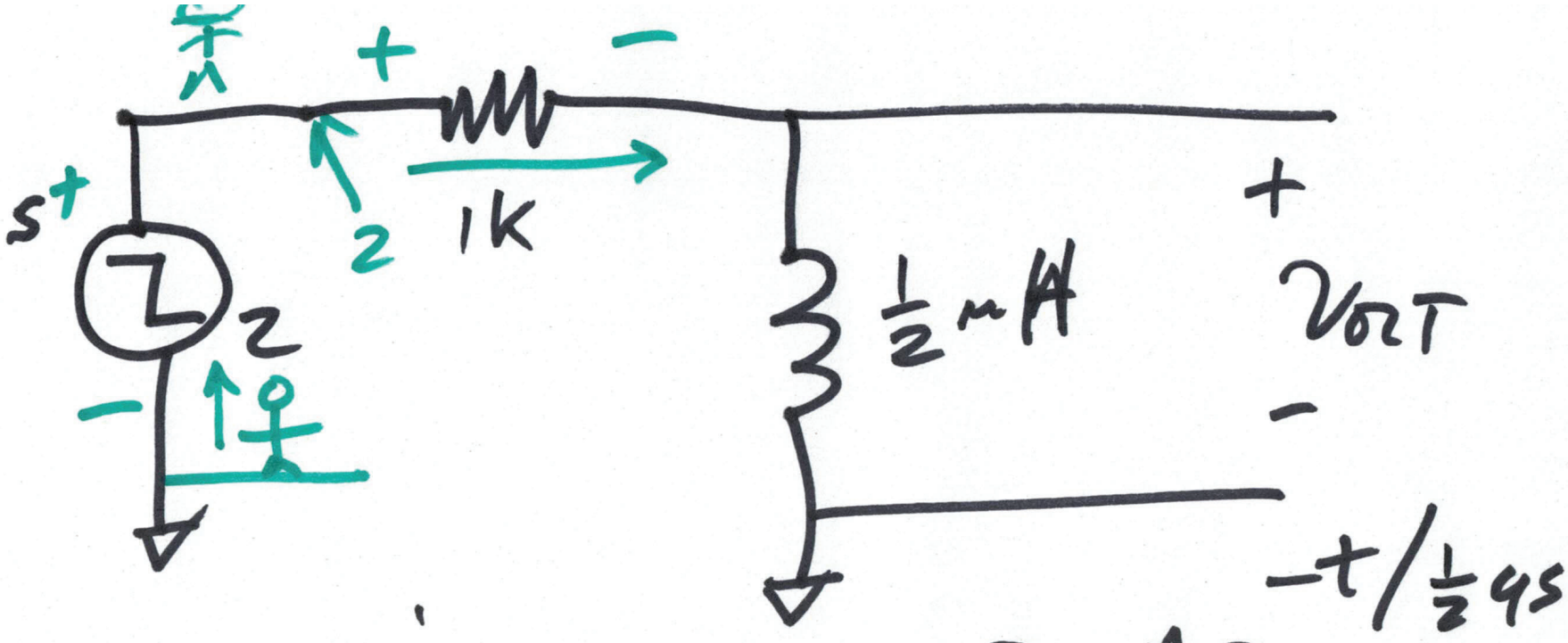
$$3 \sim A \cdot \left(\frac{-1}{500n}\right) e^{-t/500n}$$

$$= A(-b) e^{-xb}$$

$$-\frac{3}{2} \cdot \frac{10^{-6}}{\frac{1}{2} \cdot 10^{-6}} e^{-t/500n}$$

$$v_L = -3 e^{-t/500n}$$

8)



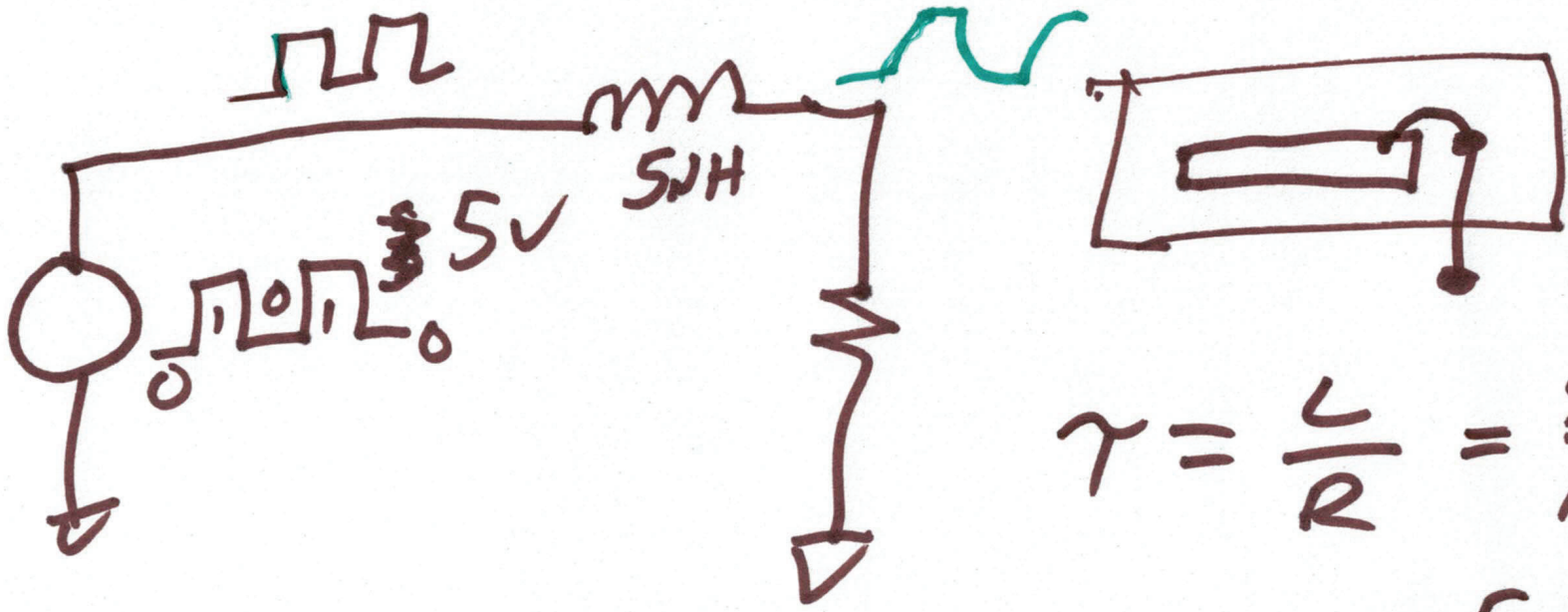
$i_L = 2A + 3mA\,e^{-t/\frac{1}{2}\mu s}$

$2 - 1K \cdot i_L = 2_{\Omega T}$

$2 - 2V - 3V e^{-t/\frac{1}{2}\mu s} = 2_{\Omega T}$

$2_{\Omega T} = -3 e^{-t/\frac{1}{2}\mu s}$

8)



$$\tau = \frac{L}{R} = \frac{5nH}{1K}$$

$$= 5ps$$