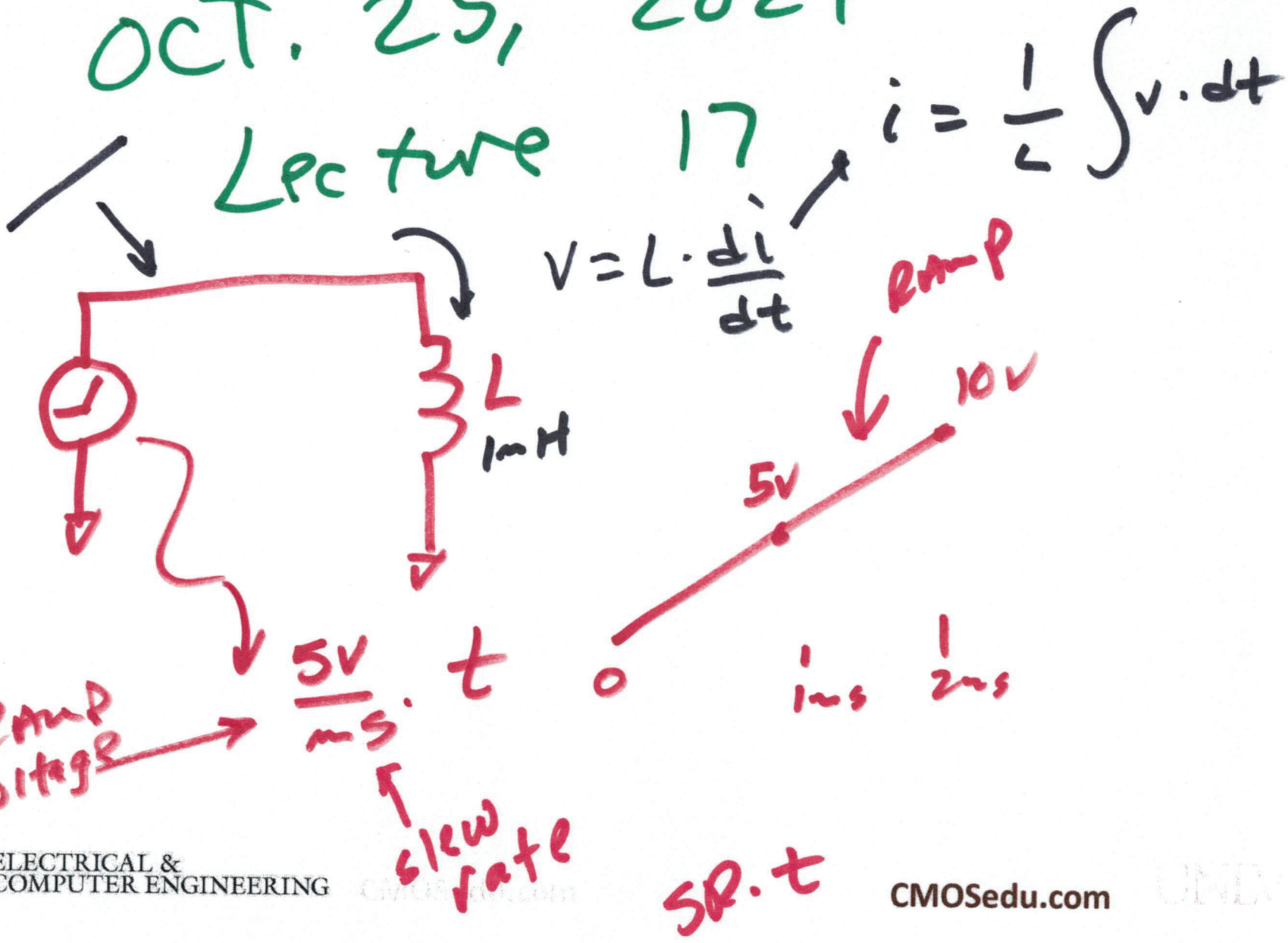
EE 221 Circuits 1

OCT. 25, 2021

Lecture 17



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

SR

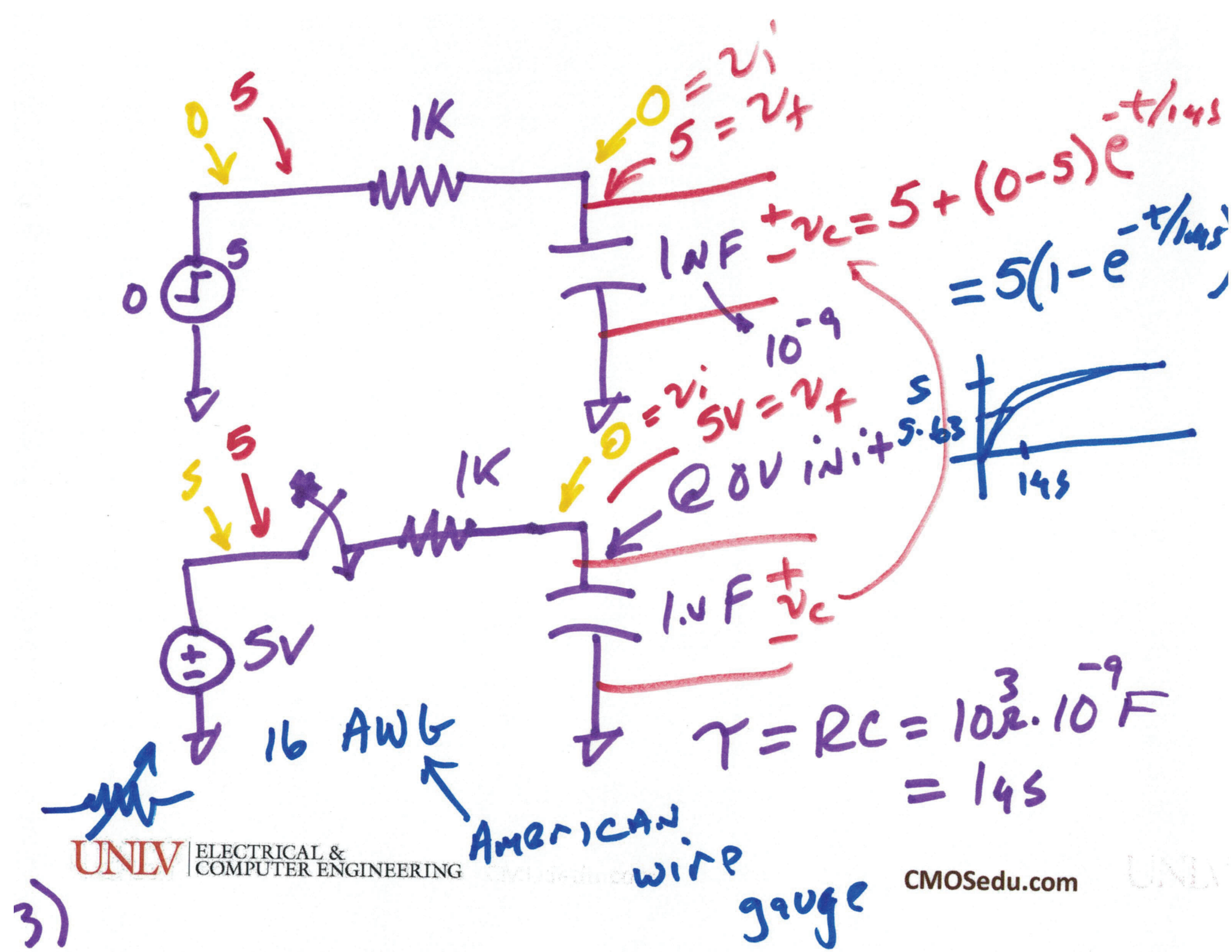
$$i = \frac{1}{1mH}\int_{0}^{t} \frac{5V}{ms}\,t\cdot dt = \frac{1}{1mH}\cdot\frac{5}{1ms}\cdot\frac{t^2}{2}\Big|$$

10^{-3} 10^{-3}

0 ← start of simulation

$$i(t) = \frac{2.5A}{(ms)^2}\cdot t^2$$

$$(10^{-3}s)^2$$


0
5
1K
0 = v_i
5 = v_f
1NF
10^{-9}
$+ v_c - = 5 + (0-5)e^{-t/14s}$
$= 5(1-e^{-t/14s})$
0 = v_i
5V = v_f
@ 0V initial
5
5.63
14s
1K
1.NF
$+ v_c -$
5V
16 AWG
American wire gauge
$\tau = RC = 10\Omega \cdot 10^{-9} F$
$= 14s$
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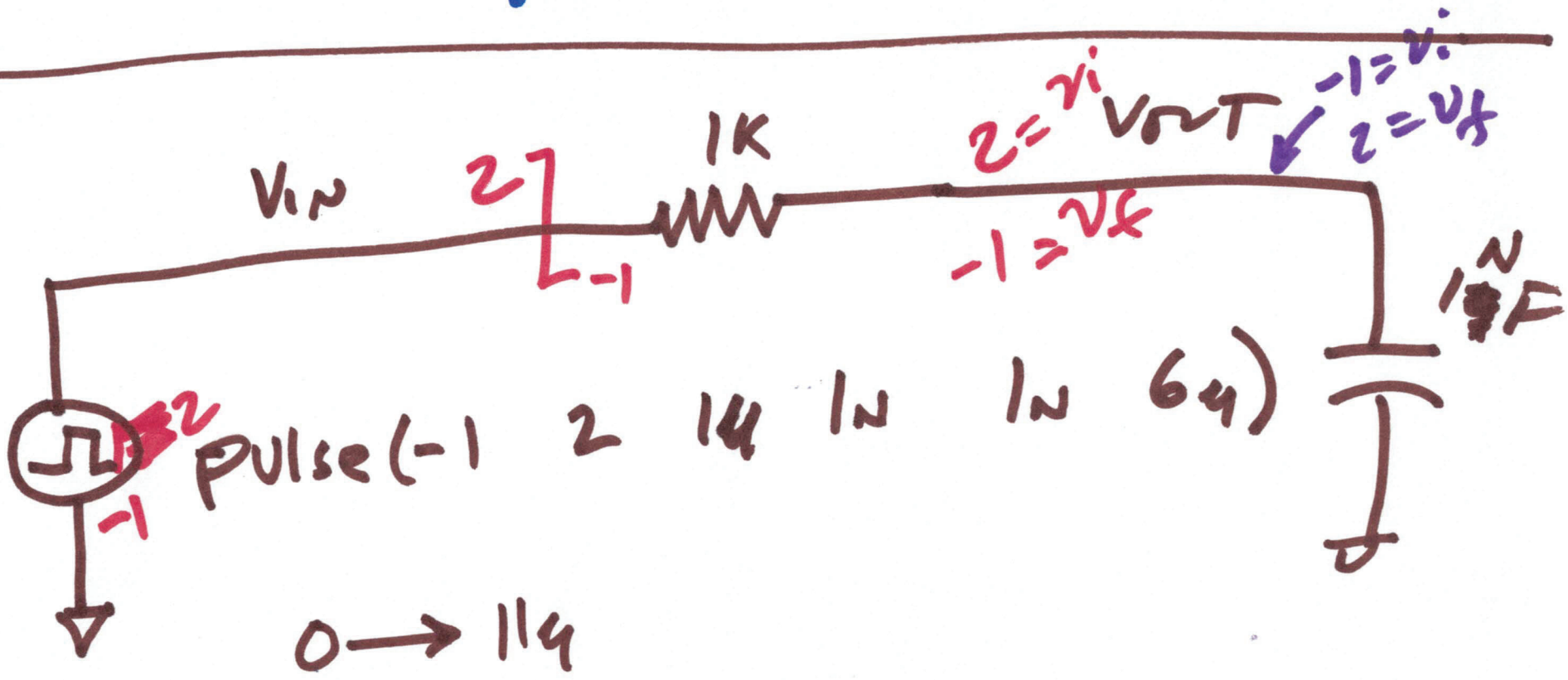
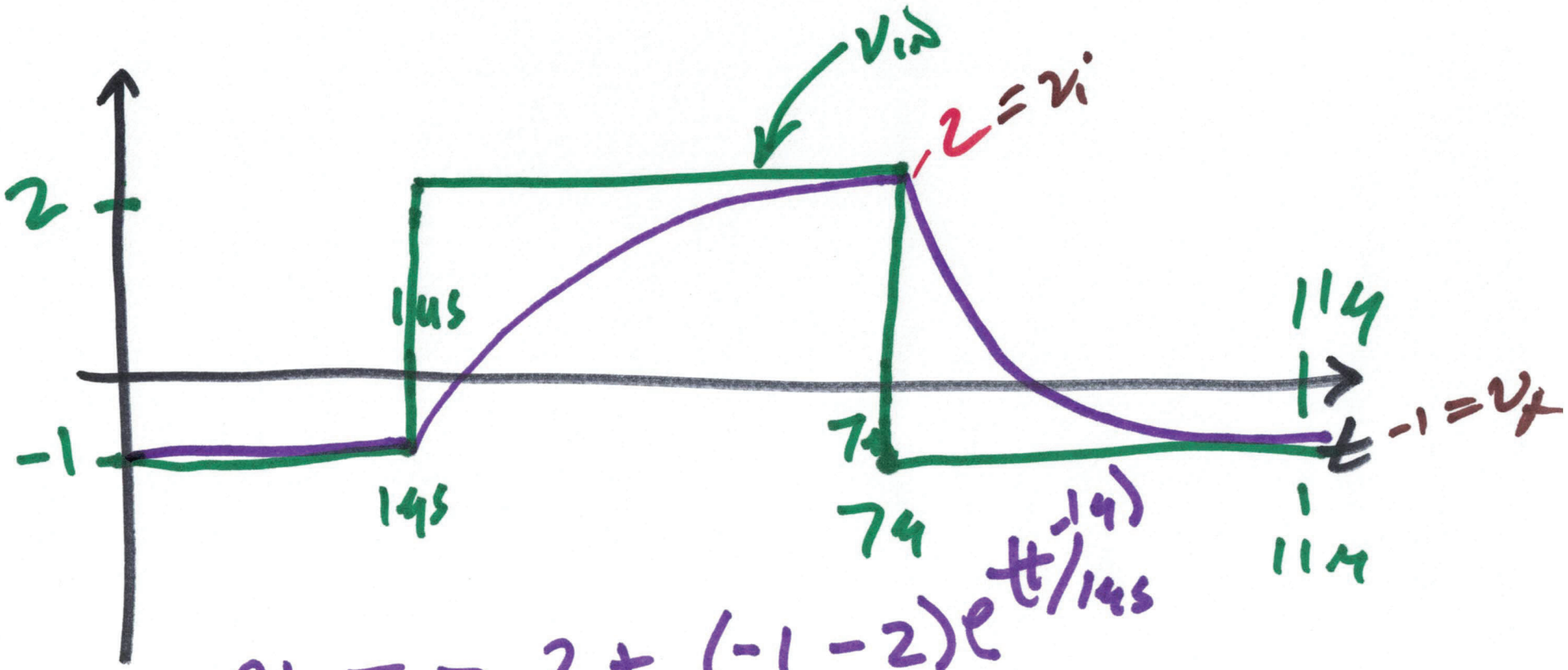
3)

$$v_c(t) = 5\left(1 - e^{-\frac{(t-1ns)}{1ns}}\right) \quad t \geq 1ns$$

$$v_c(t) = 0 \qquad t \leq 1ns$$





$$v_{OUT} = 2 + (-1-2)e^{-(t-1\mu)/1\mu s}$$

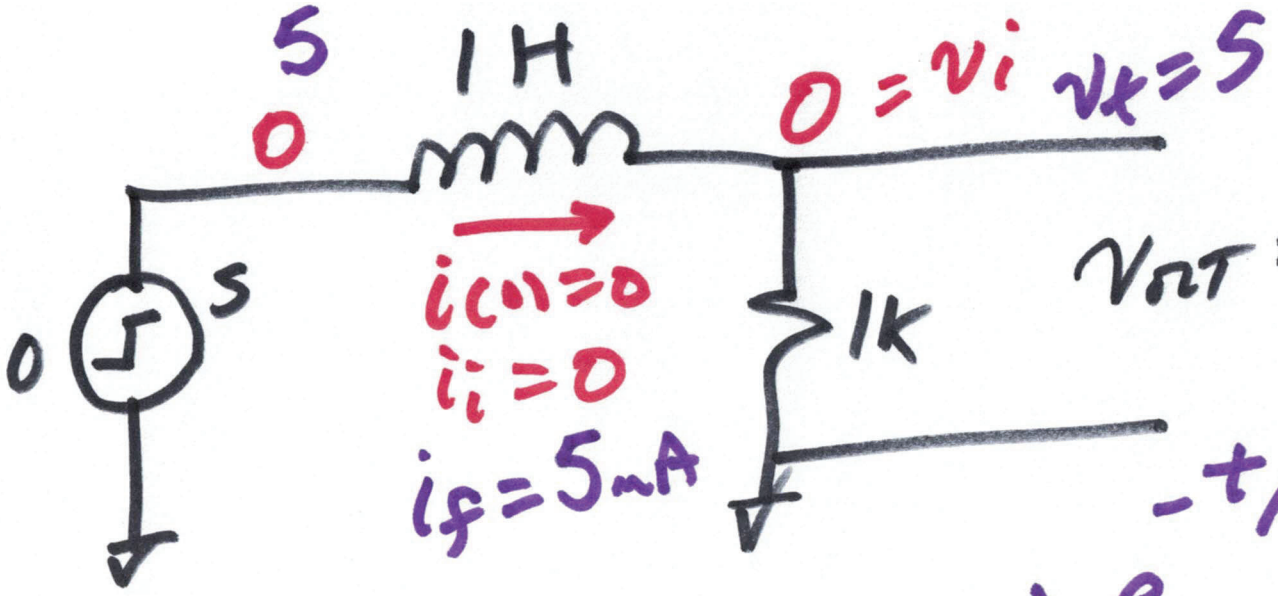
$$1\mu \le t \le 7\mu s$$

$$v_{OUT} = -1V \qquad t \le 1\mu s$$

$$v_{OUT} = -1 + (2-(-1))e^{-(t-7\mu)/1\mu}$$

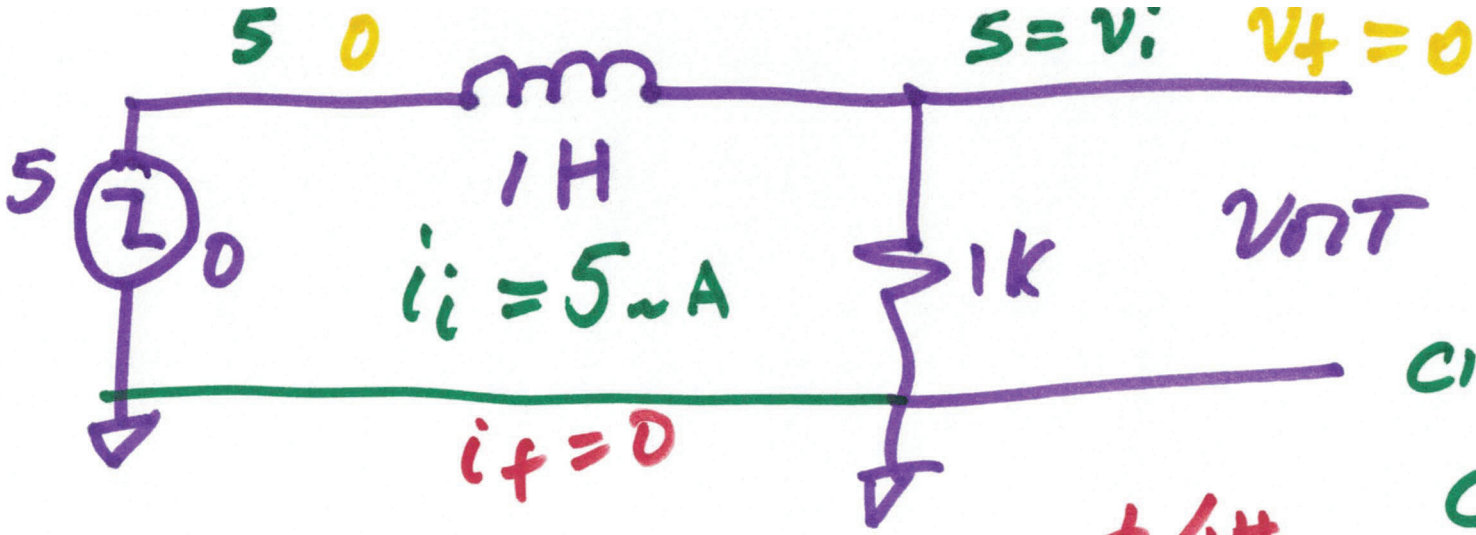
v_f v_i v_t $t \ge 7\mu$

5)



$$v_{OT} = 5 + (0-5)\,e^{-+/\frac{1H}{1K}}$$

$$i = 5mA + (0-5mA)\,e^{-+/\frac{1H}{1K}}$$



circa

ca.

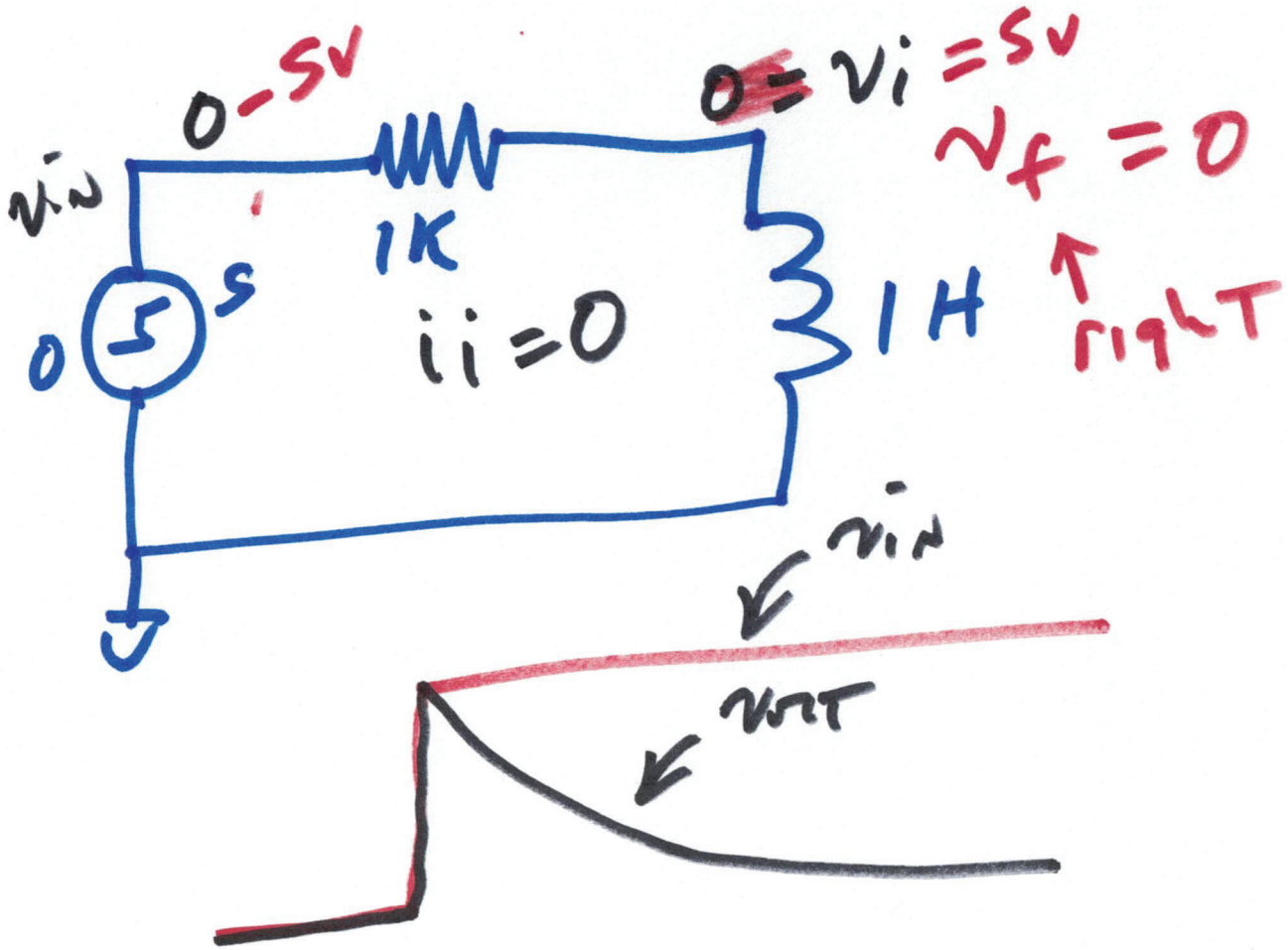
ca. 1880

$$v_{OUT}(t) = 0 + (5-0)e^{-t/\frac{1H}{1K}}$$

$$i(t) = 0 + (5mA-0)e^{-t/\frac{1H}{1K}}$$

$$\tau_L = \frac{L}{R} \text{ (seconds)}$$

$$\tau_R = RC \text{ (seconds)}$$


0-5V
0=vi=5V
vf=0
vin
1K
1H
ii=0
0
5
s
RIGHT
vin
vout