EE 220 circuits 1

OCT. 30, 2019

Lecture 18

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

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

$$v_i(t) = \frac{1V}{100\mu} \cdot t$$

$$i_L(t) = \frac{1}{400\mu} \int_0^{100\mu} \frac{1}{100\mu} t \, dt$$

ΔV_L

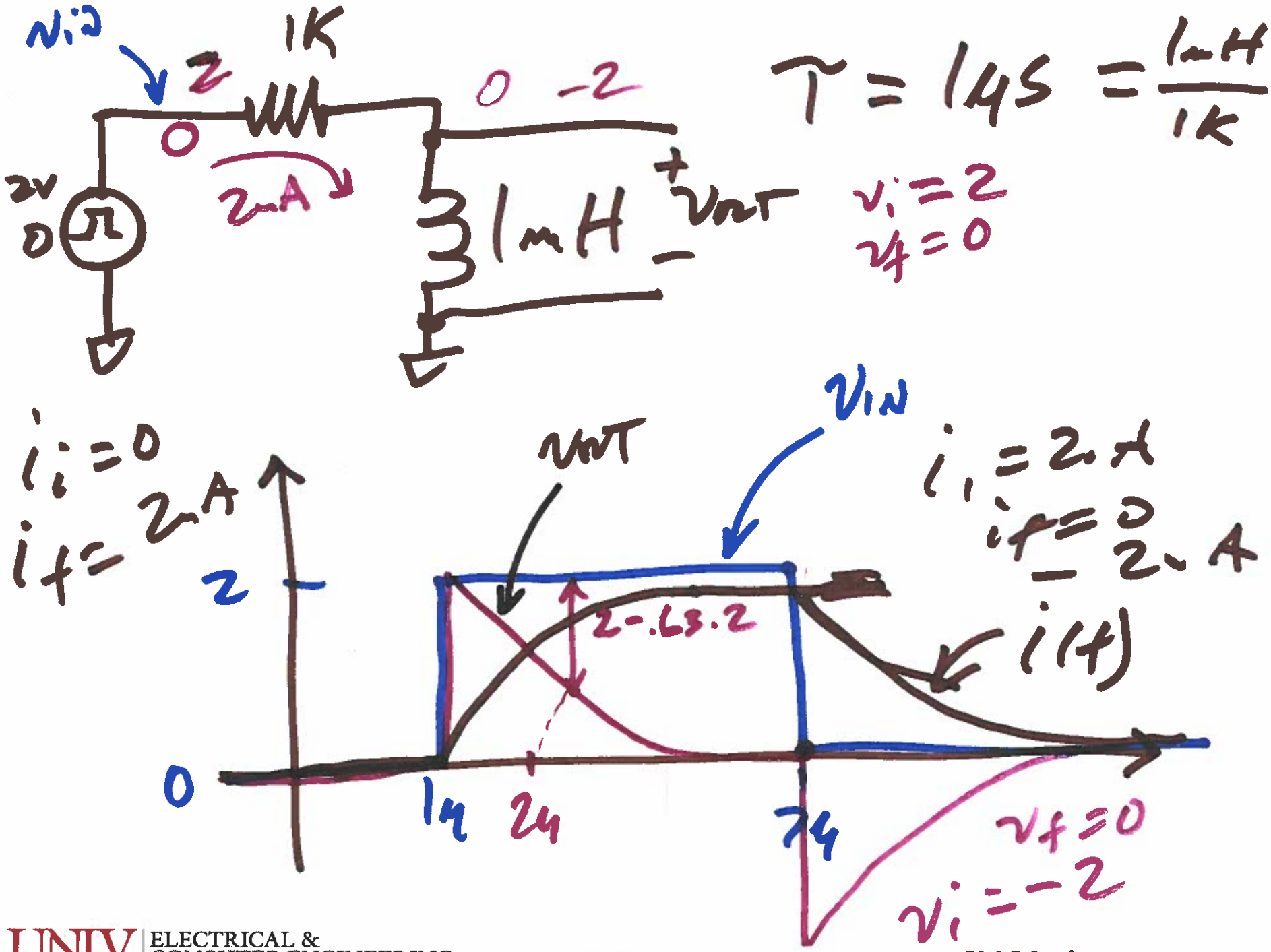
$.125 \cdot 10^8$

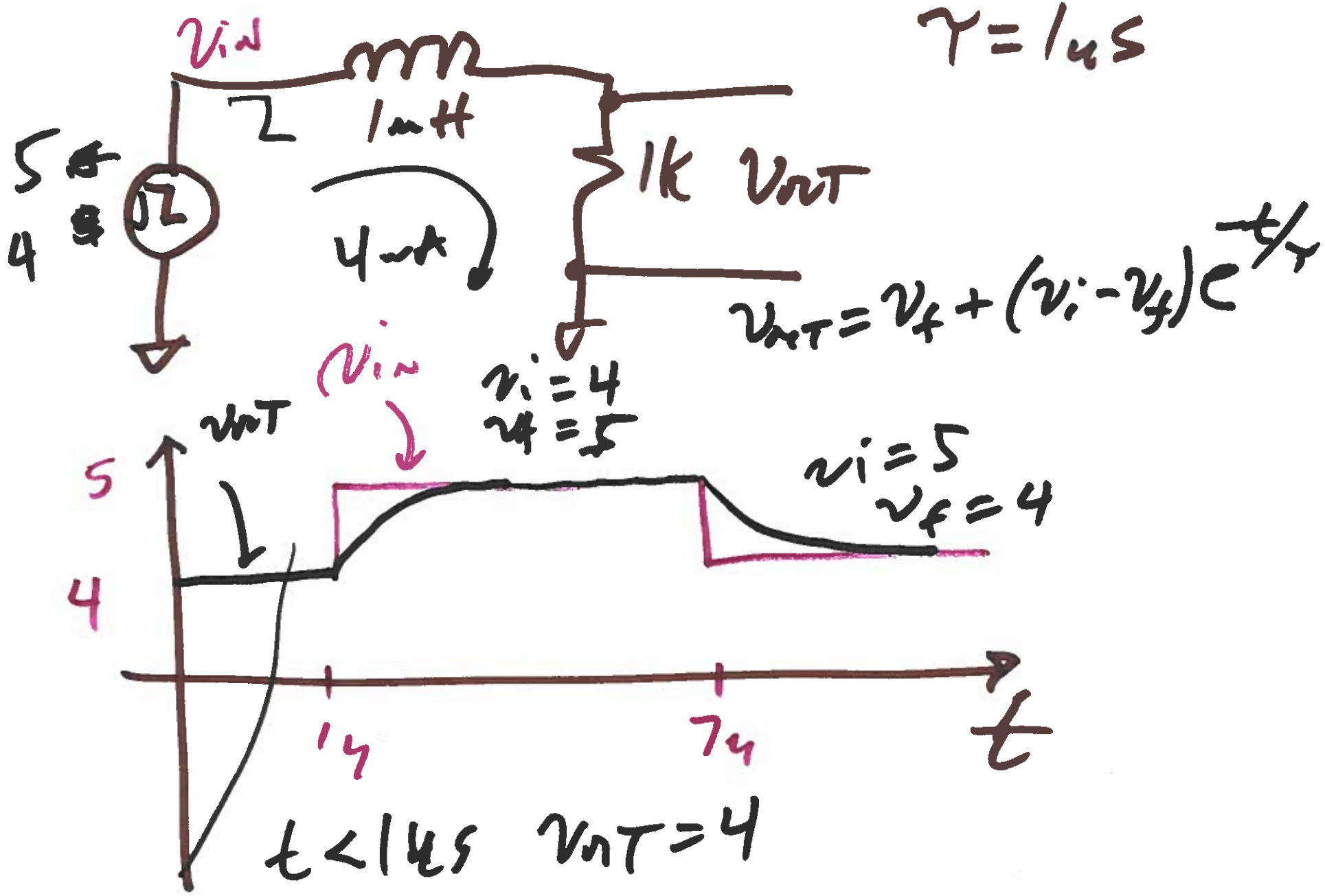
$$12.5 \cdot 10^6 \cdot t^2 = \frac{1}{4 \cdot 10^4 \cdot 10^{-12}} \frac{t^2}{2} \Big|_0^t$$

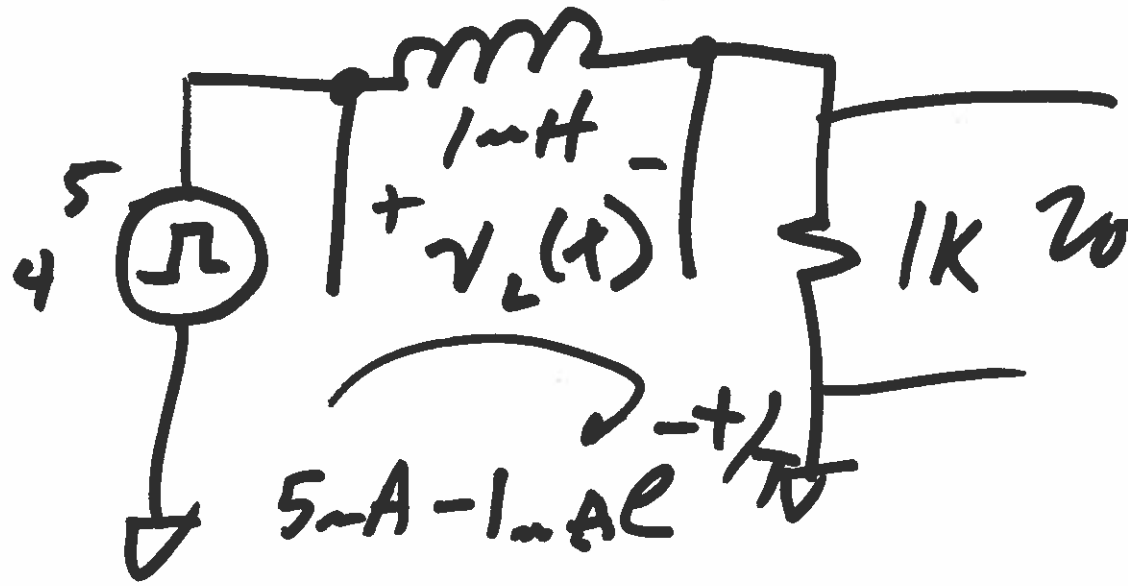
$\checkmark$

$(t - 100\mu)^2$

$100\mu \leq t \leq 200\mu$


Vin
2
1K
0
-2
2V
0
2mA
1mH
+
VOUT
-
τ = L/R = 1mH/1K
vi = 2
vf = 0
VOUT
VIN
ii = 0
if = 2A
2
0
2-.63.2
i(t)
ii = 2A
if = 0
-2A
t1
2t
7t
vf = 0
vi = -2


$\tau = 1\mu s$
v_{in}
2
1mH
1k v_{out}
5
4
4mA
$v_{out} = v_f + (v_i - v_f)e^{-t/\tau}$
v_{in}
$v_i = 4$
$v_f = 5$
v_{out}
5
4
$v_i = 5$
$v_f = 4$
t_4
7_4
t
$t < 1\mu s \quad v_{out} = 4$



$\tau = \frac{L}{R} = 1\mu s$

$5mA - 1mA\,e^{-t/\tau}$

$v_i = 1$

$v_f = 0$

$i_i = 4mA$

$i_f = 5mA$

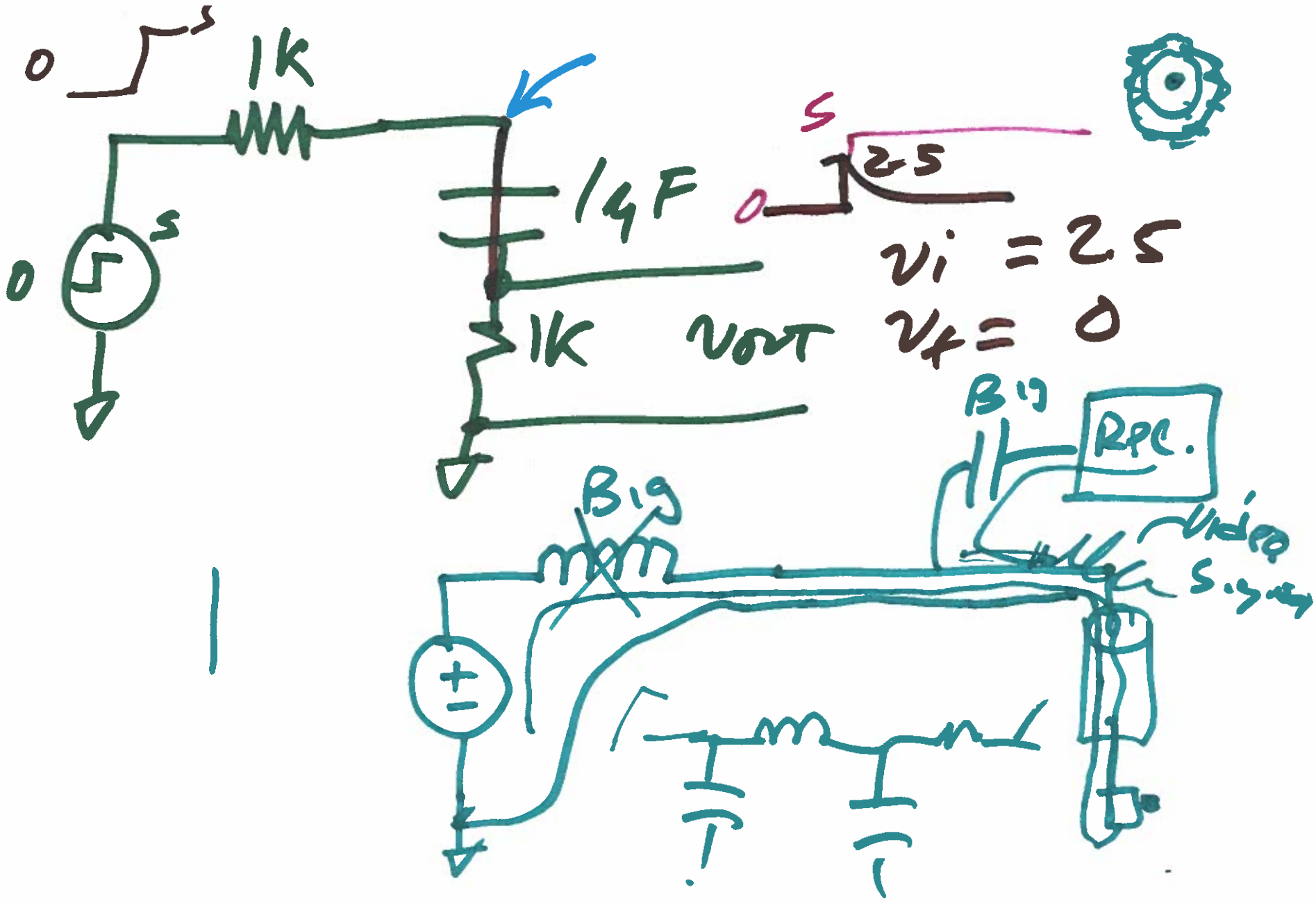
$v_L(t) = 1 \cdot e^{-t/\tau}$

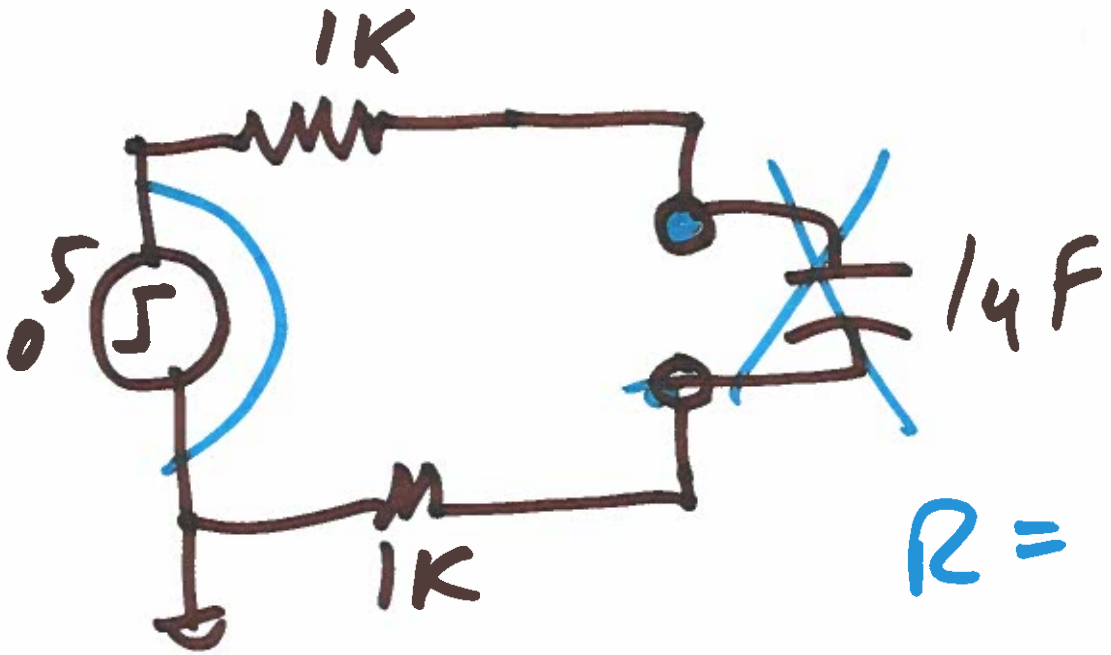
$i(t) = 5mA + (4m - 5mA)\,e^{-t/\tau}$

$= 5mA \overset{mA}{-} e^{-t/\tau}$

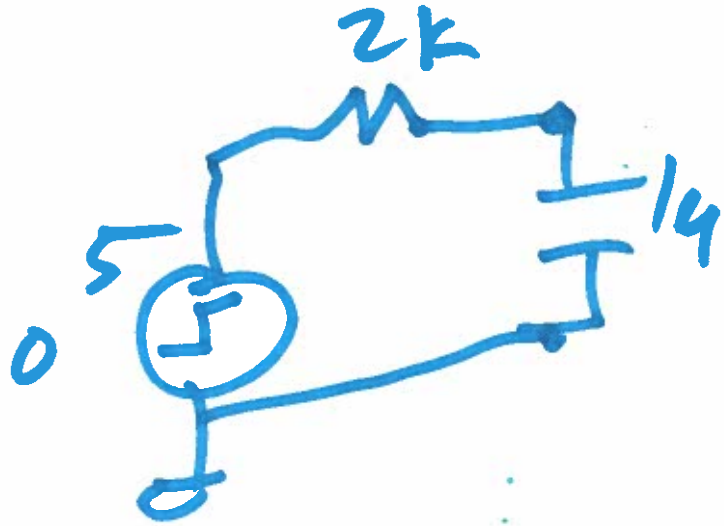
$v_{out}(t) = 5 - e^{-t/\tau}$

$v_L = 5 - (5 - e^{-t/\tau})$

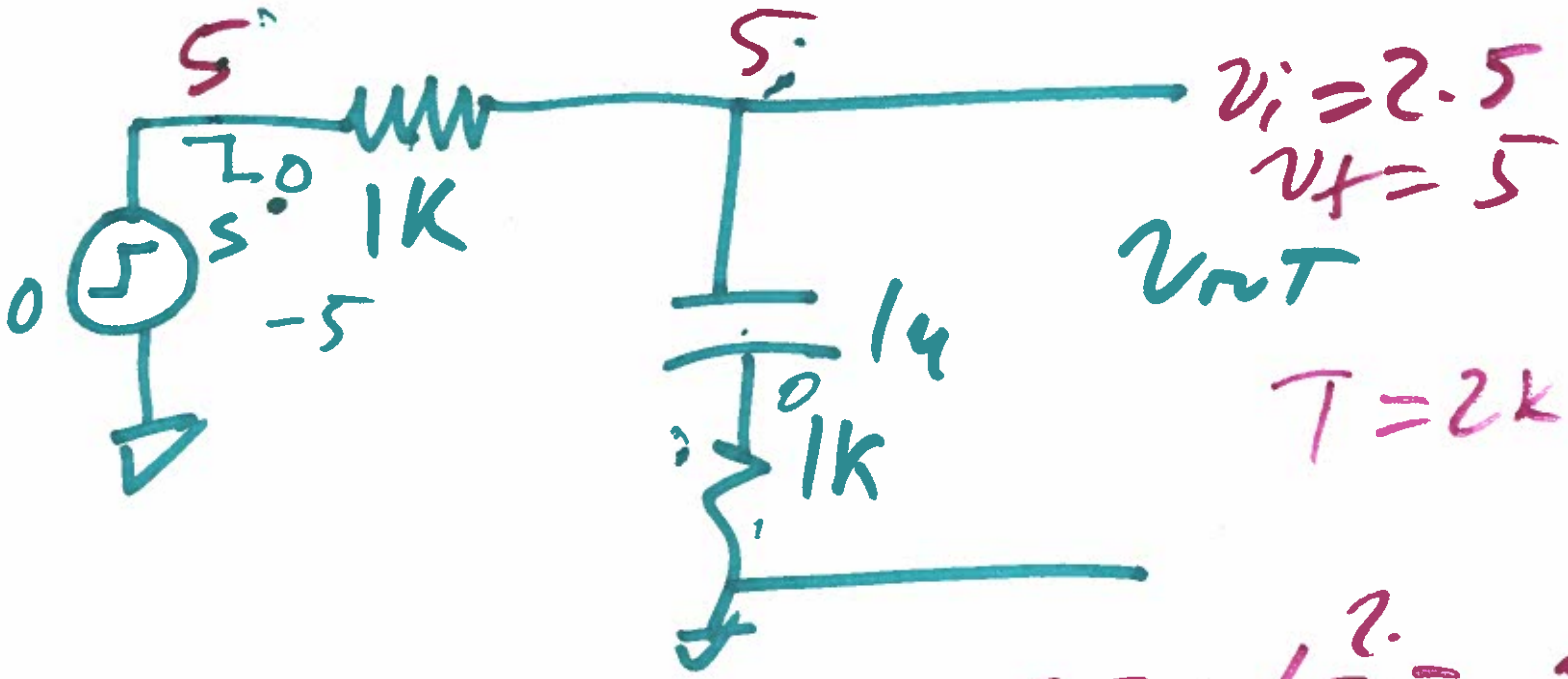

0
1K
s
0
1μF
0
s
25
$v_i = 25$
$v_f = 0$
1K
v_{OUT}
Big
RPC.
Big
Video
S.

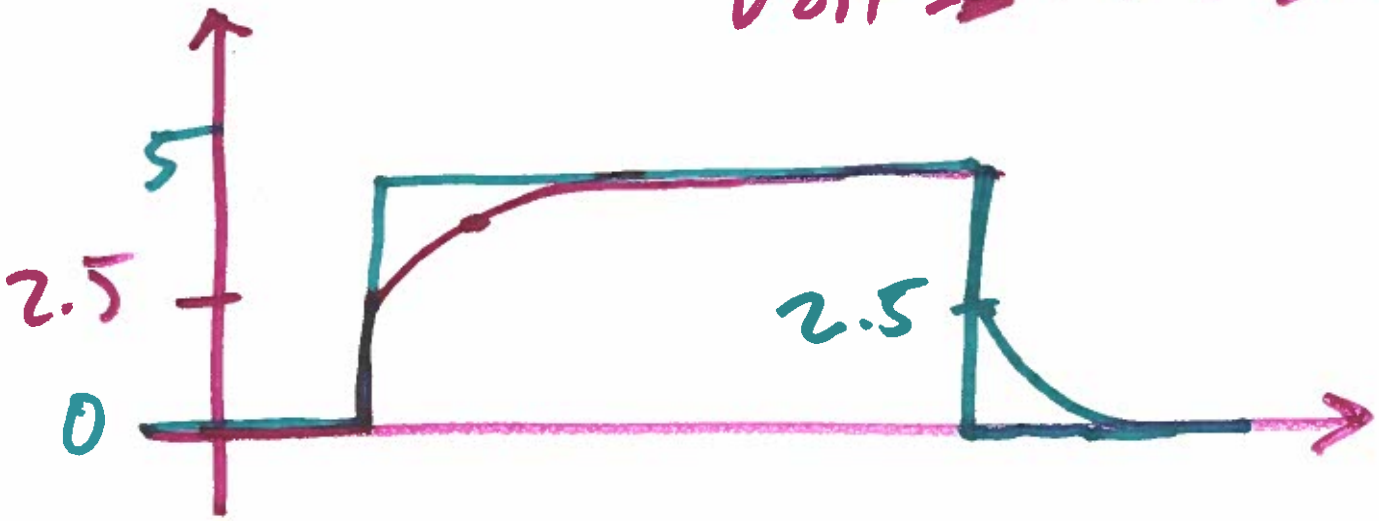


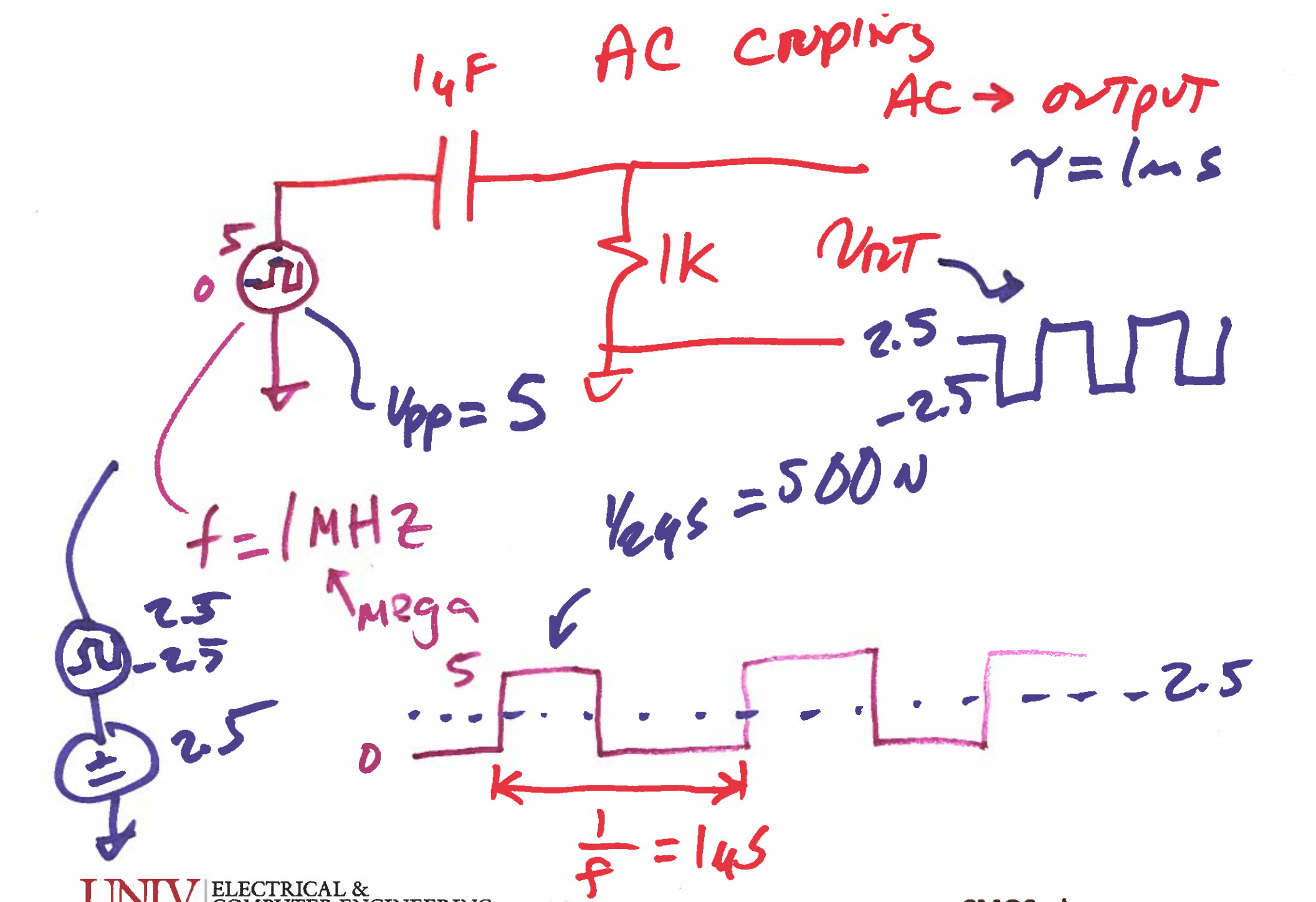
$R = 2k$



$\tau = 2k \cdot 1F$


5
5
1K
0
5
-5
1μ
0
1K
$v_i = 2.5$
$v_f = 5$
v_{oT}
$T = 2k1\mu F$
$v_{oT} = 5 + (2.5 - 5)e^{-t/\tau}$


5
2.5
0
2.5


1μF
AC coupling
AC → output
τ = 1ms
1k
V_{out}
5
0
V_{pp} = 5
2.5
-2.5
f = 1MHz
Mega
V_{avg} = 500mV
2.5
-2.5
2.5
5
0
2.5
$\frac{1}{f}$ = 1μs