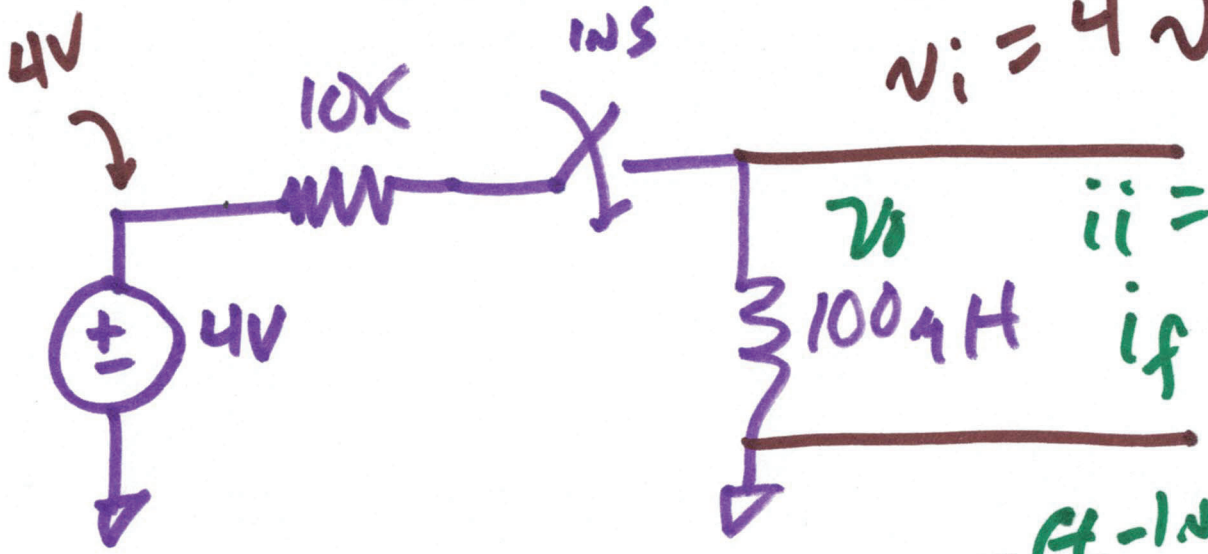
EE 220 CIRCUITS 1

Lecture 18

OCT. 27, 2021



$v_i = 4\,u_t = 0$

$\frac{L}{R} = \frac{100\times10^{-6}}{10^4}$

$= 10^2 \times 10^{-10}$

$= 10\,NS$

$i_f = \frac{4}{10K} = 400\mu A$

$= 0.4m\,A$

$v_0 = 0 + (4-0)\,e^{-(t-1NS)/10NS}$

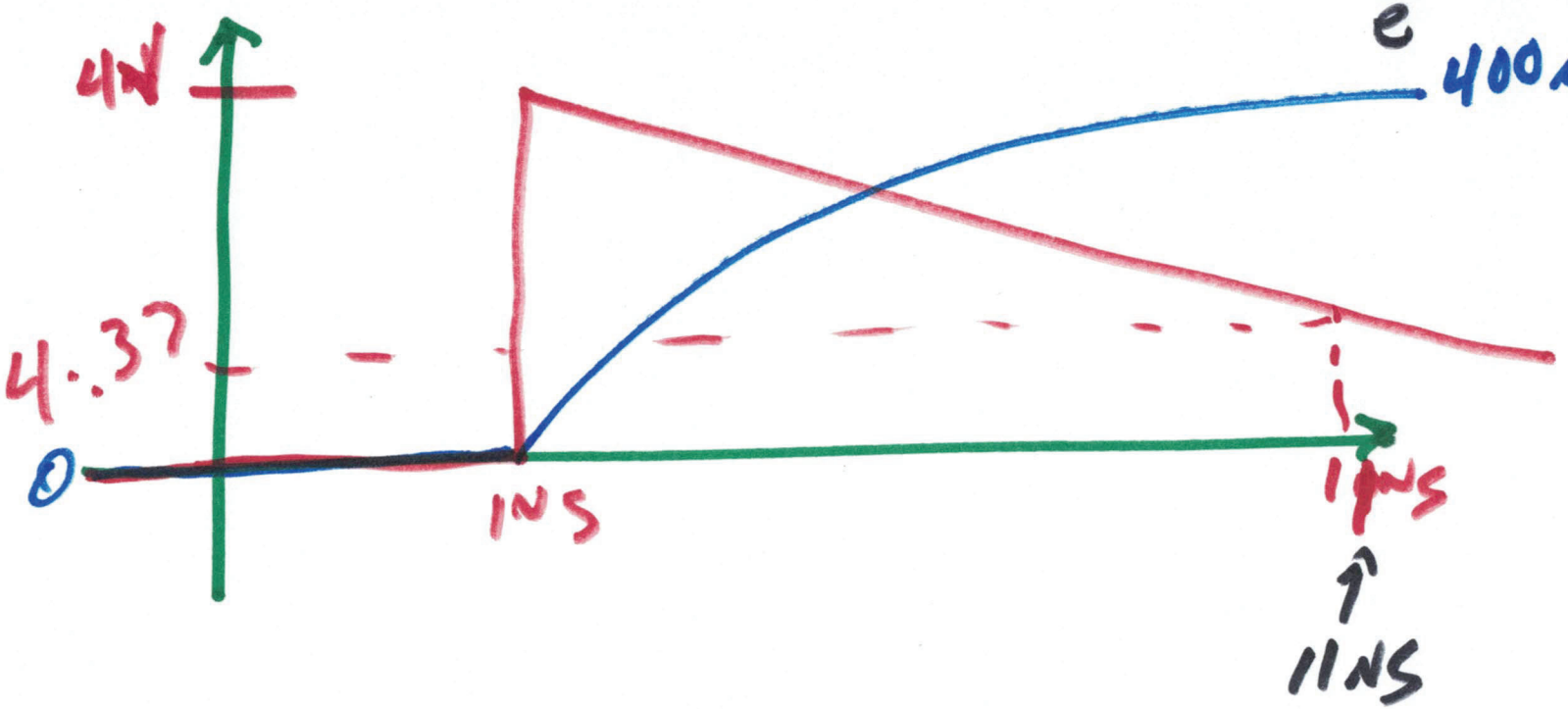
$t = 1NS$

$i = \frac{4 - v_0}{10K} = 0.4m - 0.4mA\,e^{\frac{(t-1NS)}{10NS}}$

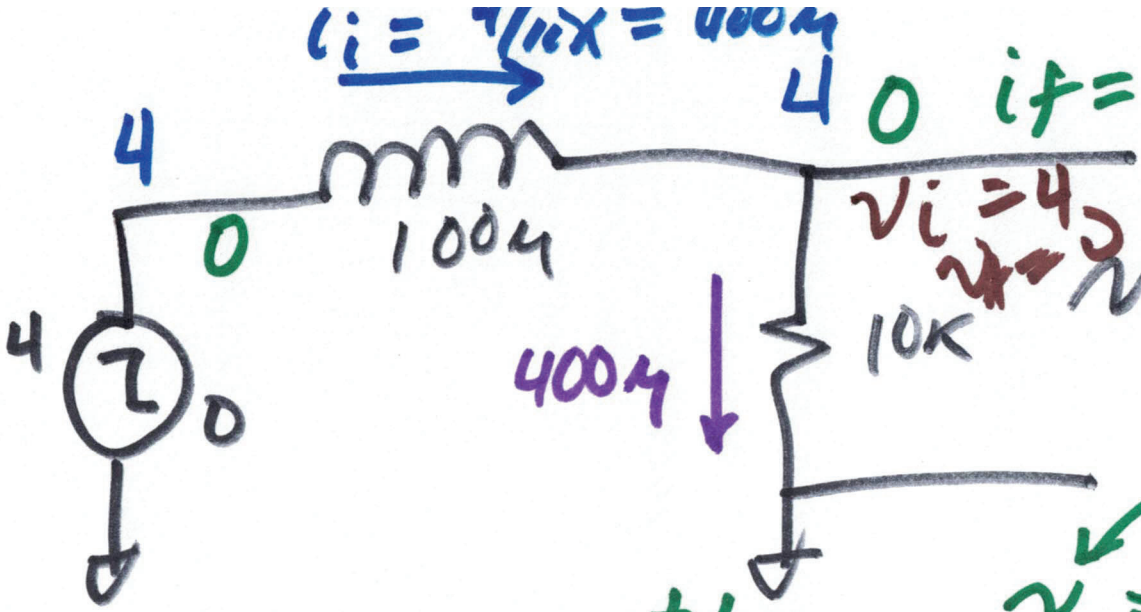
$$v_o = 4\,e^{-\frac{(t-1\text{ns})}{100\text{ps}}}$$

$t = 11\text{ns} \rightarrow v_o = 4\,e^{-\frac{10\text{ns}}{100\text{ps}}}$

$= \frac{4}{e} = 4 \cdot (.37)$



2)



$i_i = \frac{4}{10K} = 400\mu$

$i_f = 0$

CA. CIRCA

$v_i = 4$

$v_o = ?$

time constant ü

$\tau = \frac{L}{R} = \frac{100\mu}{10K}$

$= \frac{100}{10} \cdot \frac{10^{-6}}{10^{3}}$

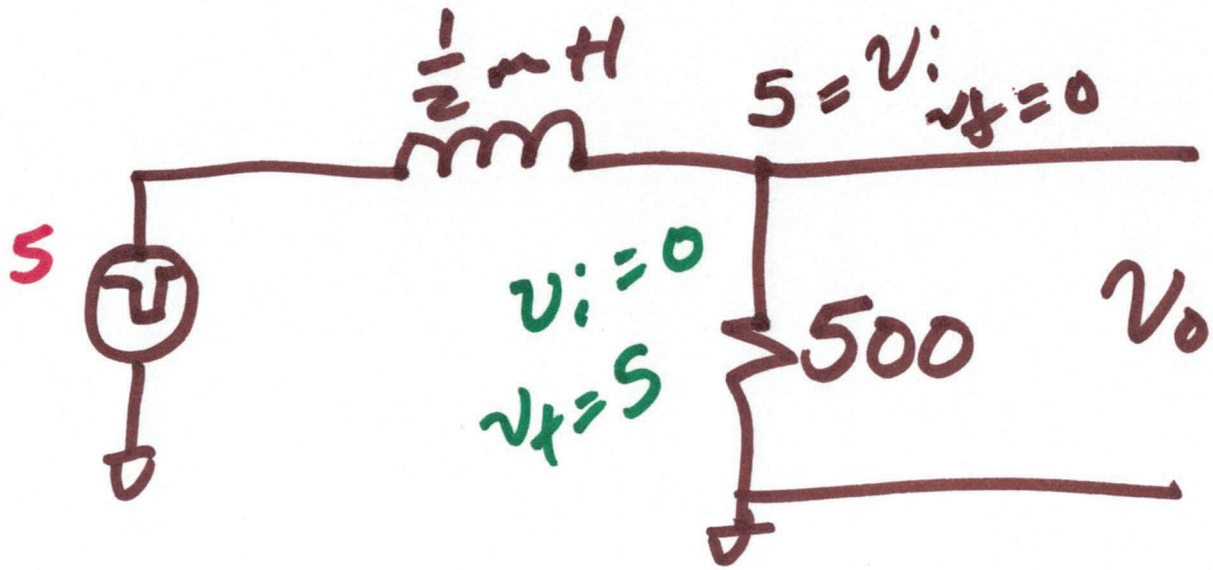
$= 10 \cdot 10^{-9}$

$= 10NS$

$i = 400\mu e^{-t/10NS}$

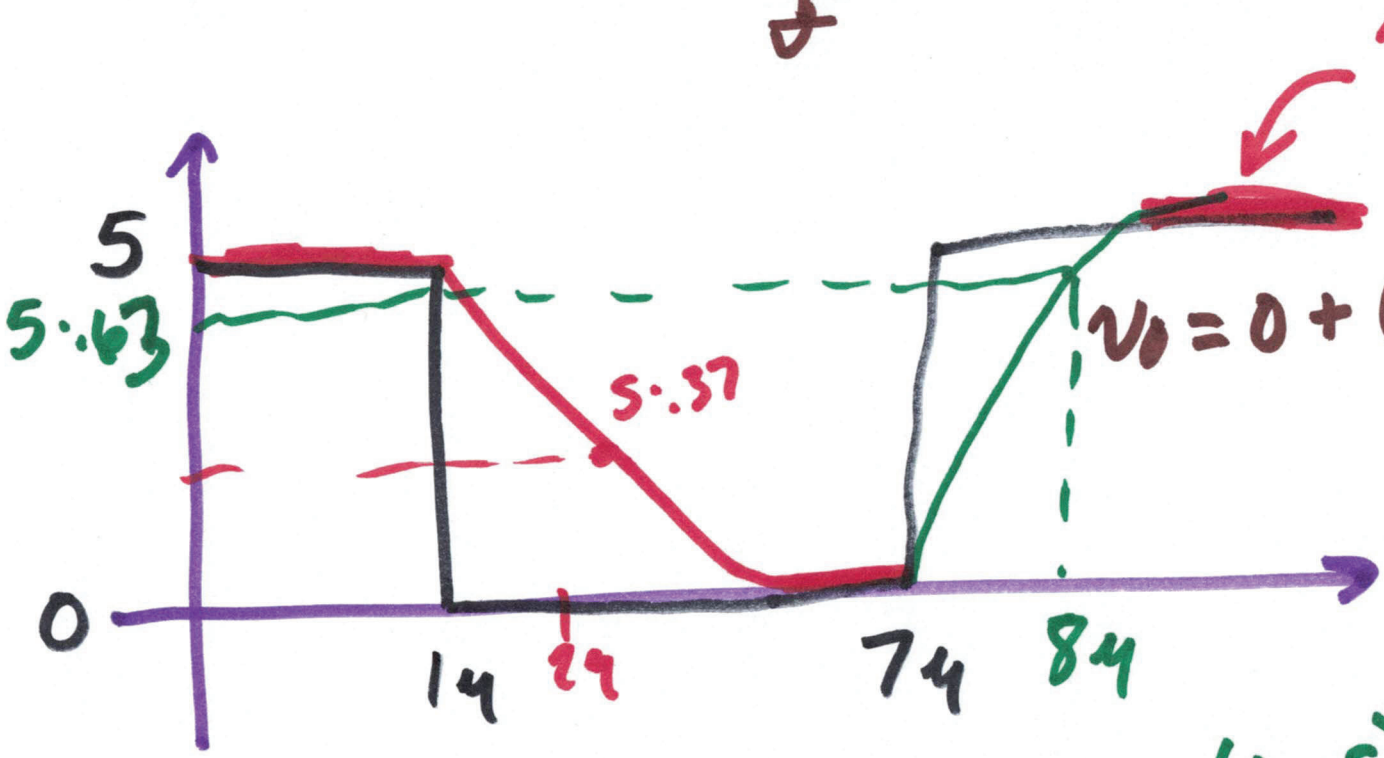
$v_o = i \cdot 10K = 4e^{-t/10NS}$

2 AU # i.e. d ≤ t_ that is



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

$$\tau = 1\mu s$$



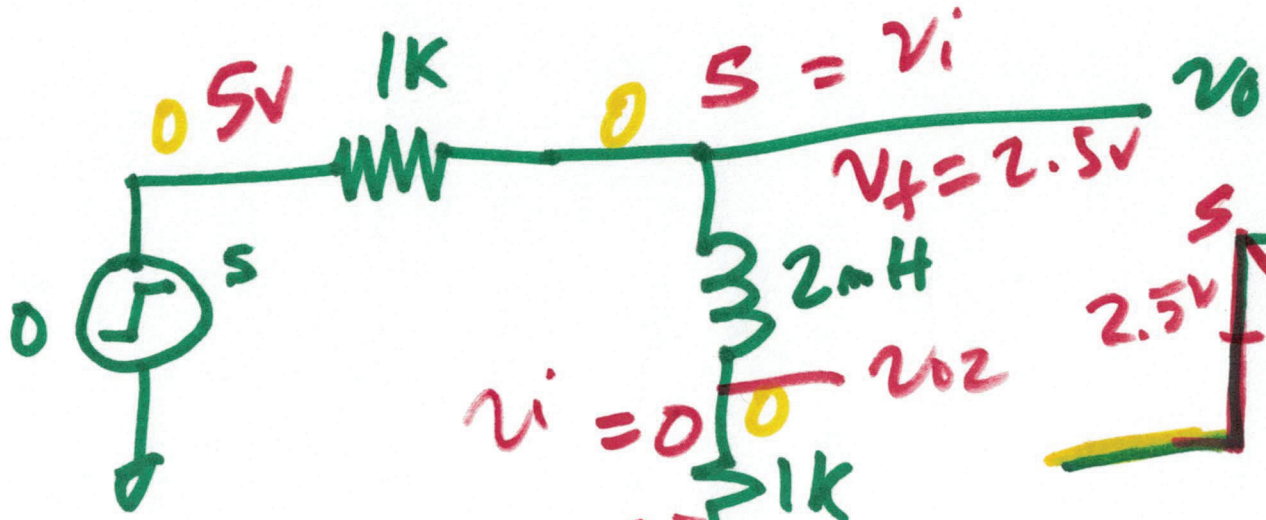
$$v_o = 0 + (5-0)e^{-\frac{(t-1\mu)}{1\mu}}$$

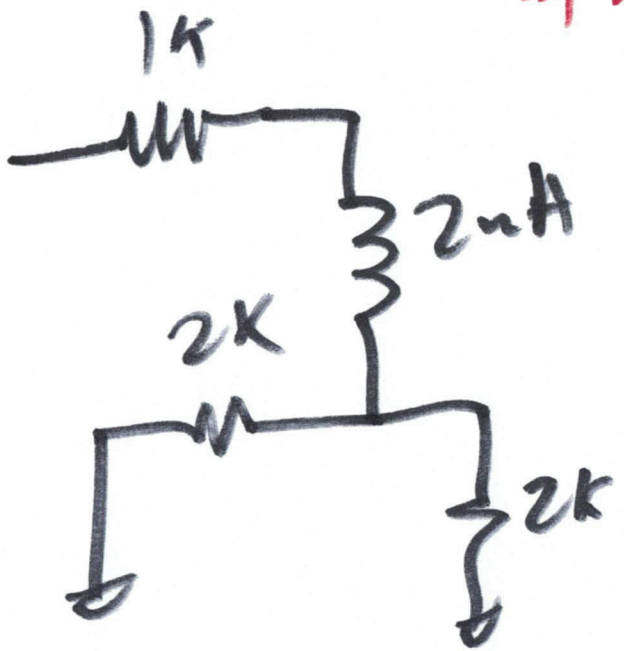
$$t \geq 1\mu$$

$$t \leq 7\mu$$

$$v_o = 5 + (0-5)e^{-\frac{(t-7\mu)}{1\mu}}$$

$$t \geq 7\mu$$

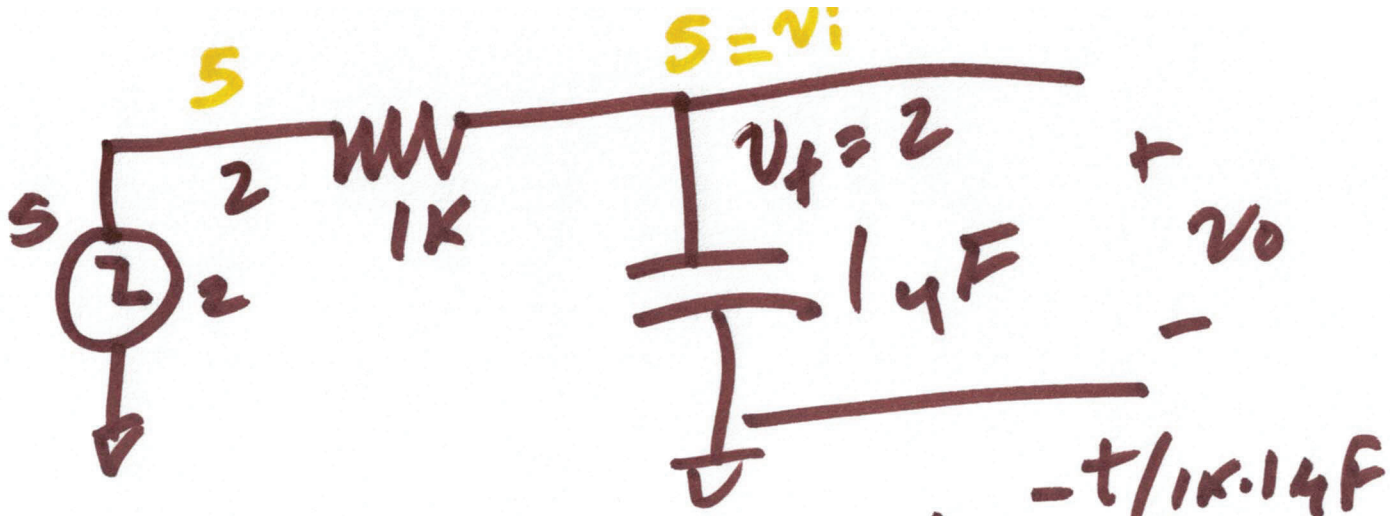




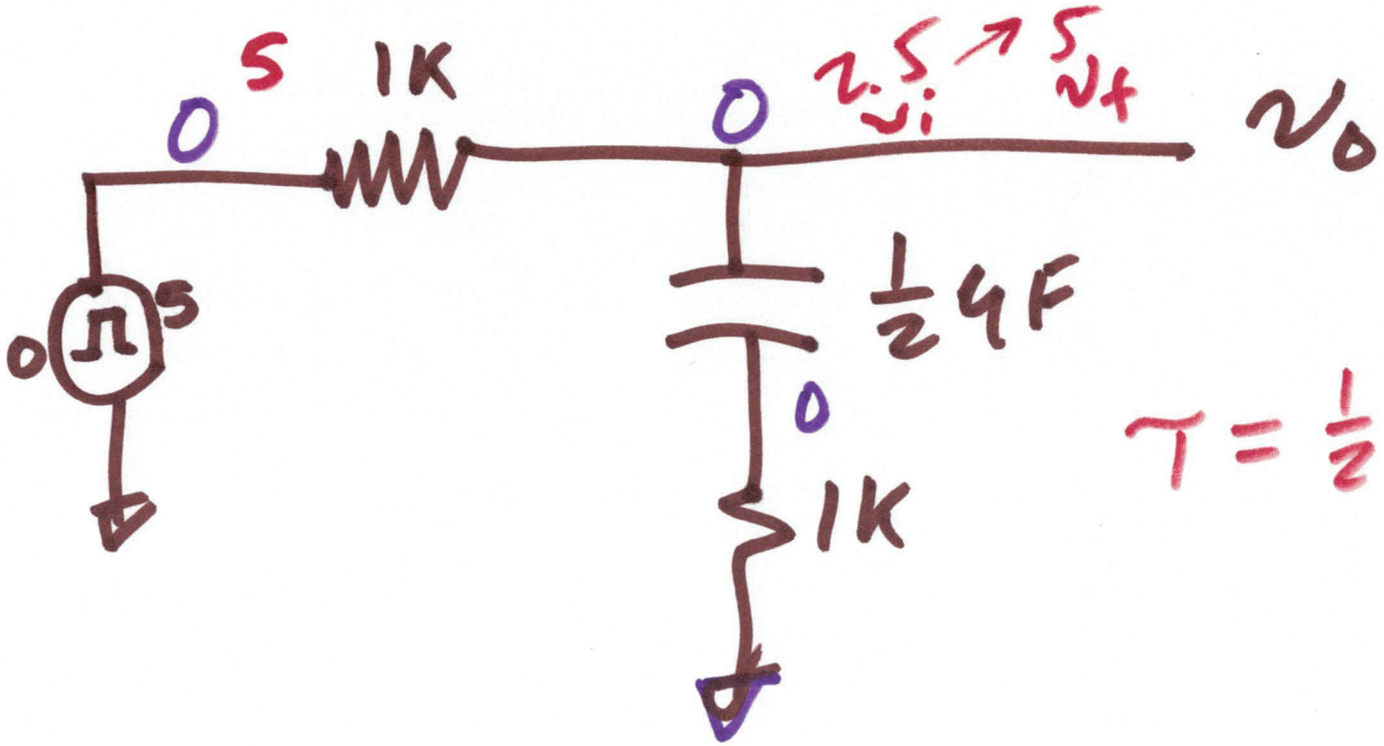
$$\tau = \frac{L}{R+R} = \frac{2mH}{1K+1K}$$

$$v_0 = 2.5 + (5 - 2.5)e^{-t/\tau}$$

$$v_{02} = 2.5 + (0 - 2.5)e^{-t/\tau}$$



$$v_o = 2 + (5-2)e^{-t/1K \cdot 1\mu F}$$



$$\tau = \tfrac{1}{2}4(1K + 1K)$$
$$= 1ms$$

$$v_o = 5 + (2.5 - 5)e^{-t/}$$