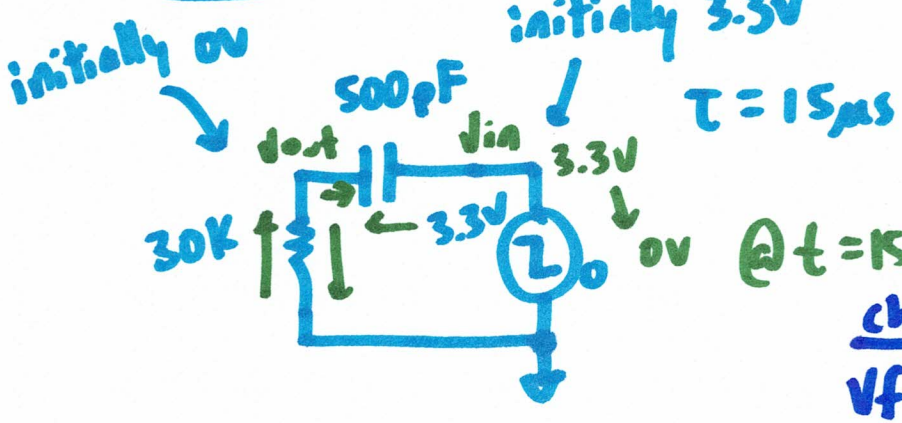
EE 220: Circuits I



"FIFE" equation

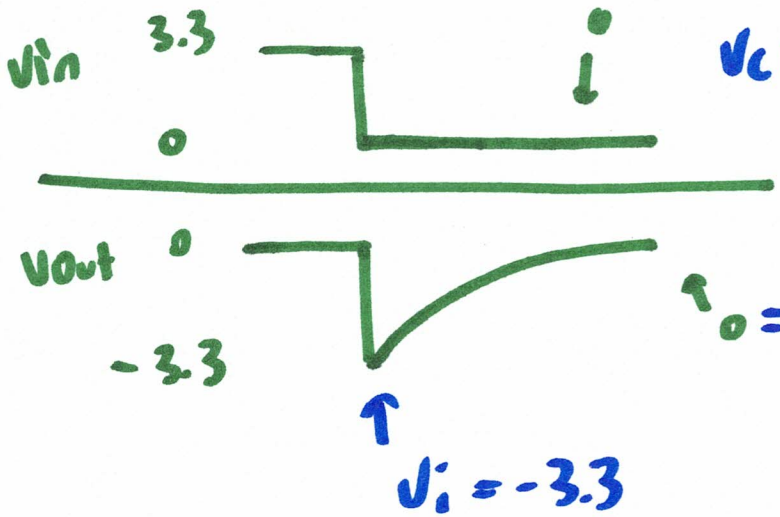
$$V_c(t) = V_f + (V_i - V_f)e^{-t/\tau}$$

$\tau = R \cdot C$

charging:

$V_f = V_f$, $V_i = 0$

$$V_c(t) = V_f - V_f e^{-t/\tau}$$
$$= V_f(1 - e^{-t/\tau})$$

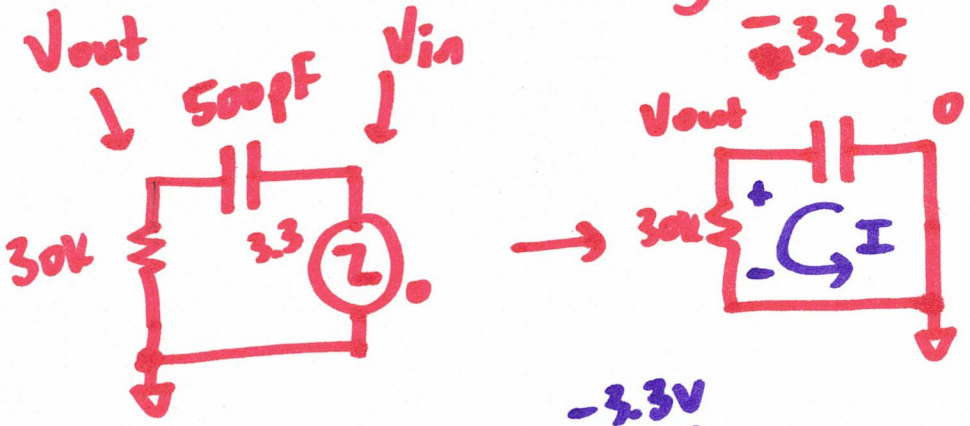


discharging:

$V_f = 0$, $V_i = V_i$

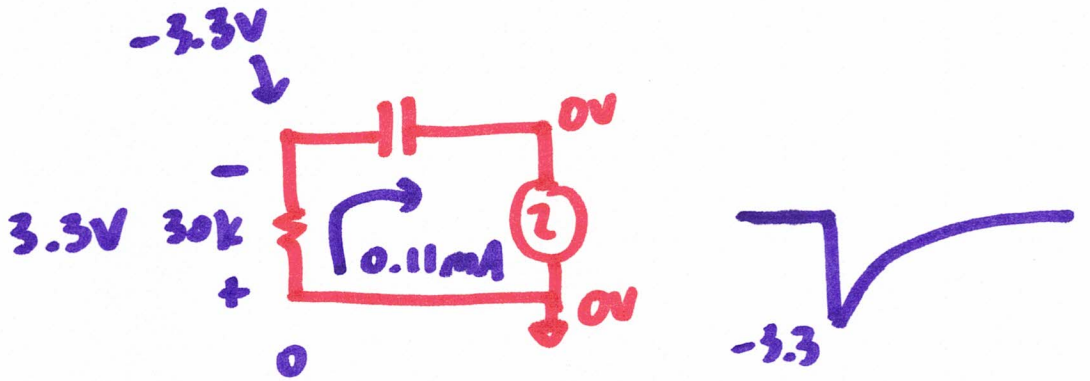
$$V_c = V_i \cdot e^{-t/\tau}$$

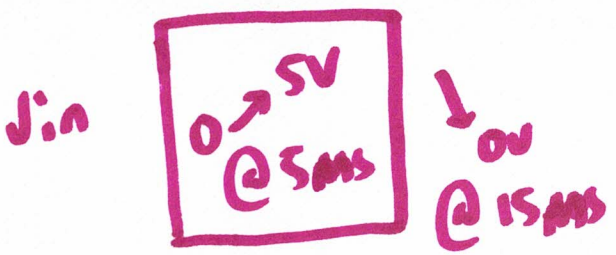
Using KVL to Solve RC circuits

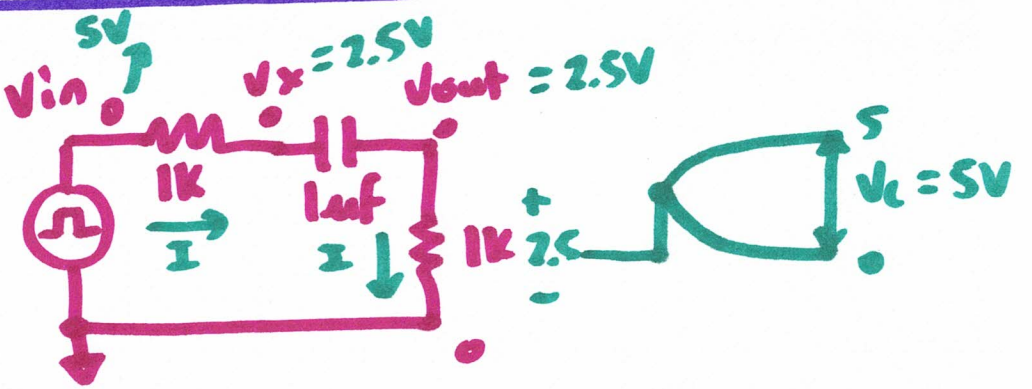


$$-3.3V - I \cdot 30k = 0$$

$$\frac{-3.3V}{30k} = \frac{I \cdot 30k}{30k} \rightarrow I = -0.11mA$$



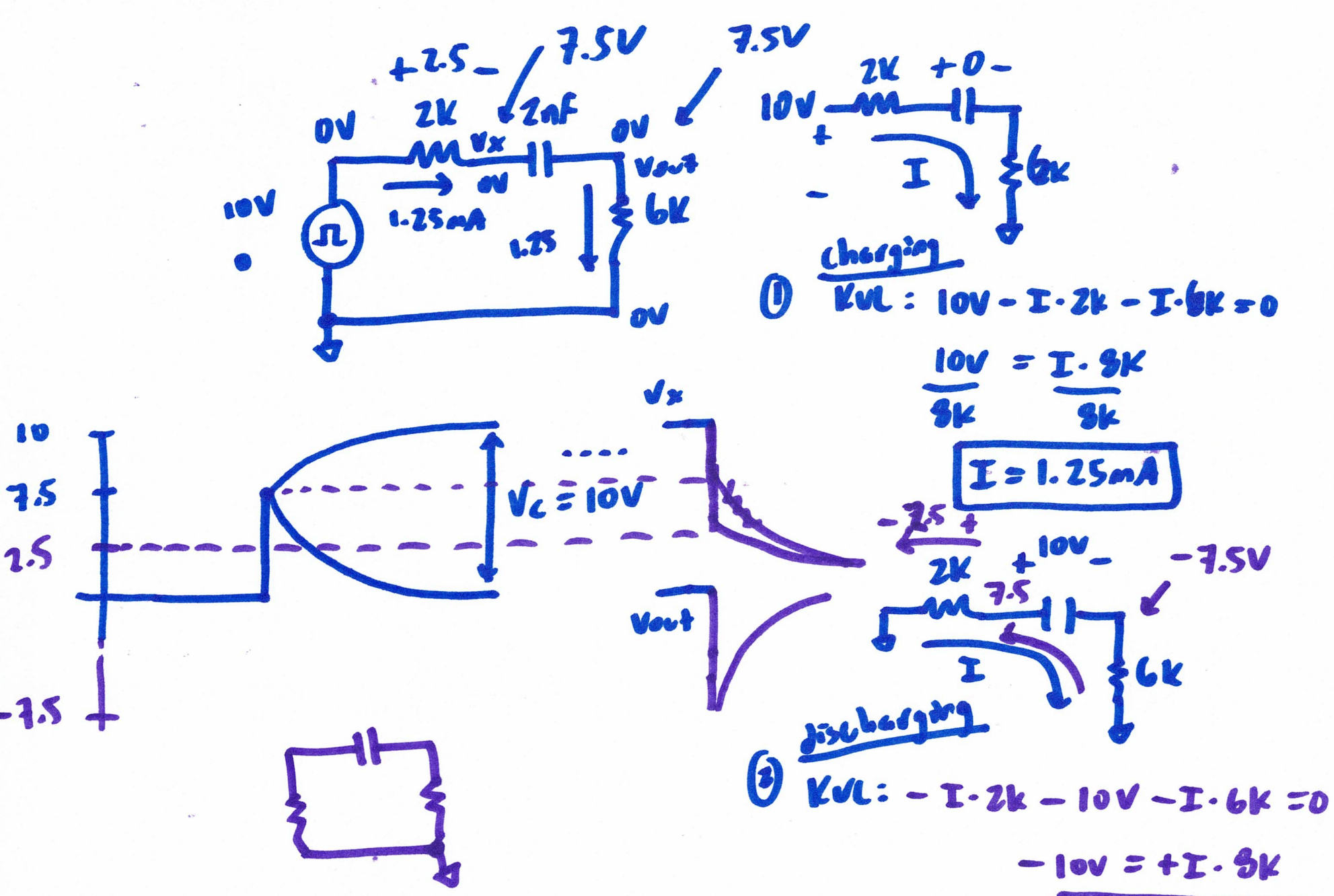




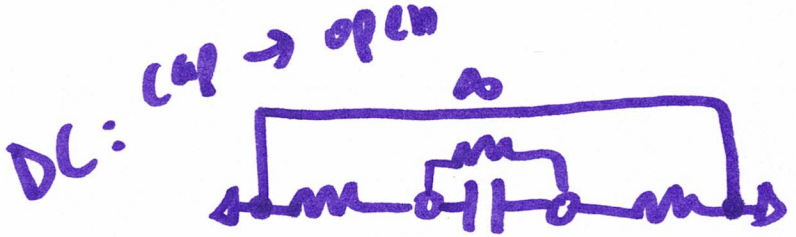
$$5V - I \cdot 1K + 0 - I \cdot 1K = 0$$

$$\frac{5V}{2k} = \frac{I \cdot 2k}{2k} \rightarrow I = 2.5mA$$

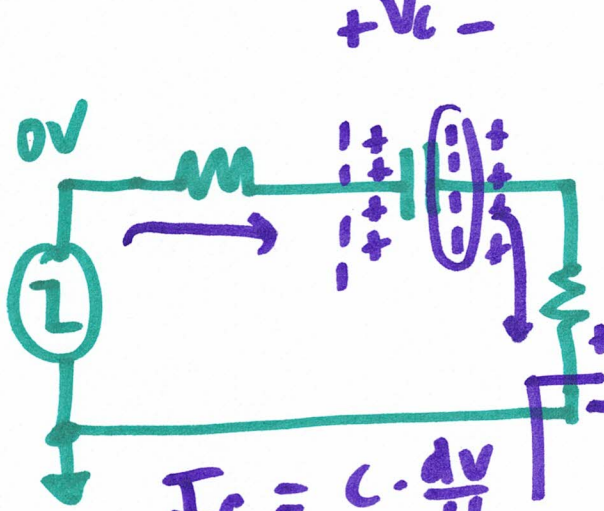
UNLV | HOWARD R. HUGHES COLLEGE OF ENGINEERING



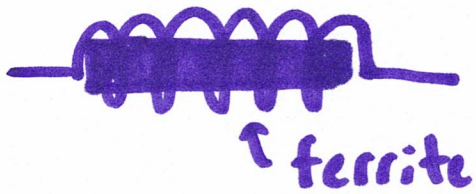
UNLV | HOWARD R. HUGHES COLLEGE OF ENGINEERING



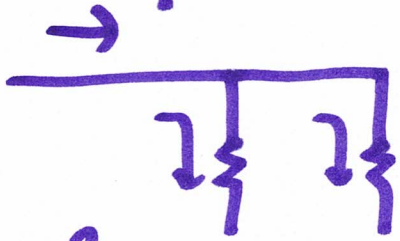
$V = L \cdot \frac{dI}{dt}$



$I_C = C \cdot \frac{dV}{dt}$



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



Resistors

Impedance → $Z_R = R$

Inductor $2\pi \cdot f$

$Z_L = j\omega L$

Impedance → $Z_C = \frac{1}{j \cdot 2\pi \cdot f \cdot C} \rightarrow \infty$

↑ $i = \sqrt{-1}$

$E_C = \frac{1}{2} \cdot C \cdot V^2$

$E_L = \frac{1}{2} \cdot L \cdot I^2$

UNLV | HOWARD R. HUGHES COLLEGE OF ENGINEERING