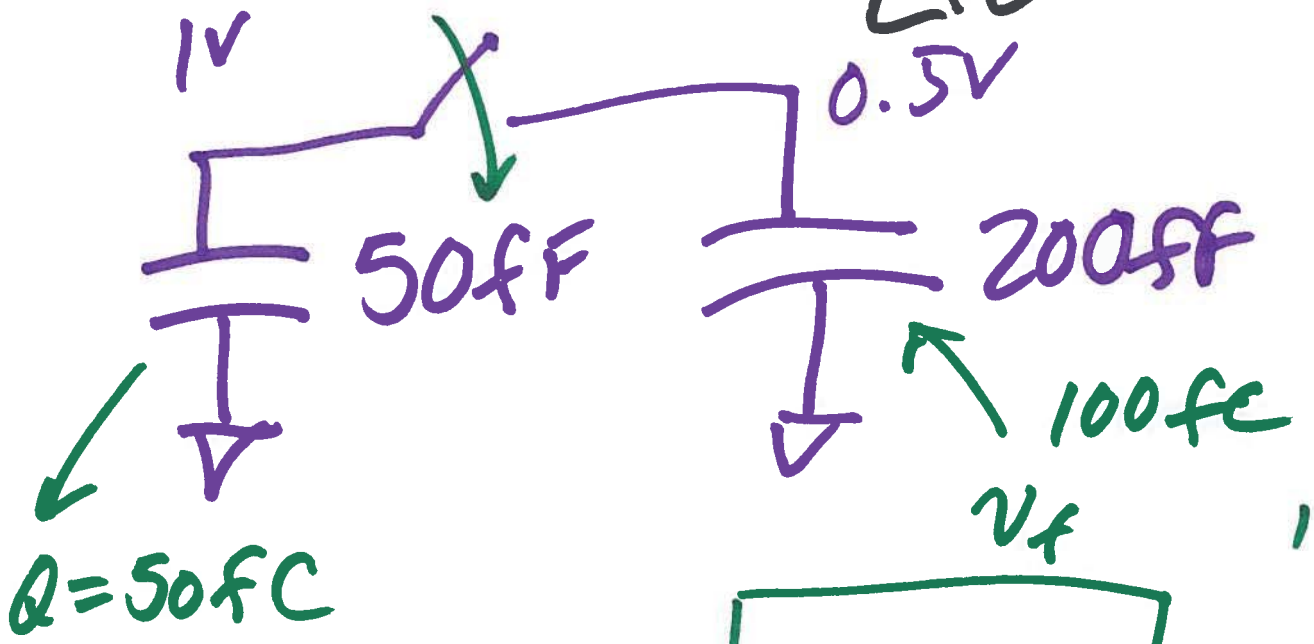
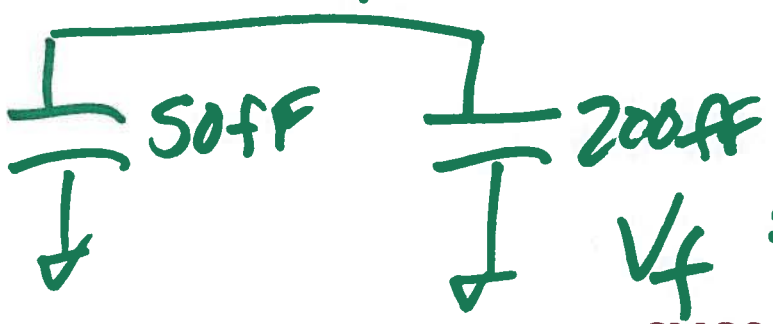
EE 220
Circuits 1
NOV. 19, 2018
Lecture 23

$CV = Q$





$150fC = V_f \, 250ff$

$V_f = \left(\frac{250}{150}\right)^{-1} \left(\frac{5}{3}\right)$

$\frac{3}{5} = 0.6$

1)

$$\mathcal{E} = \frac{1}{2}CV^2$$

$$= \frac{1}{2} \cdot 50ff \cdot 1^2 + \frac{1}{2} 200ff \cdot 0.5^2$$

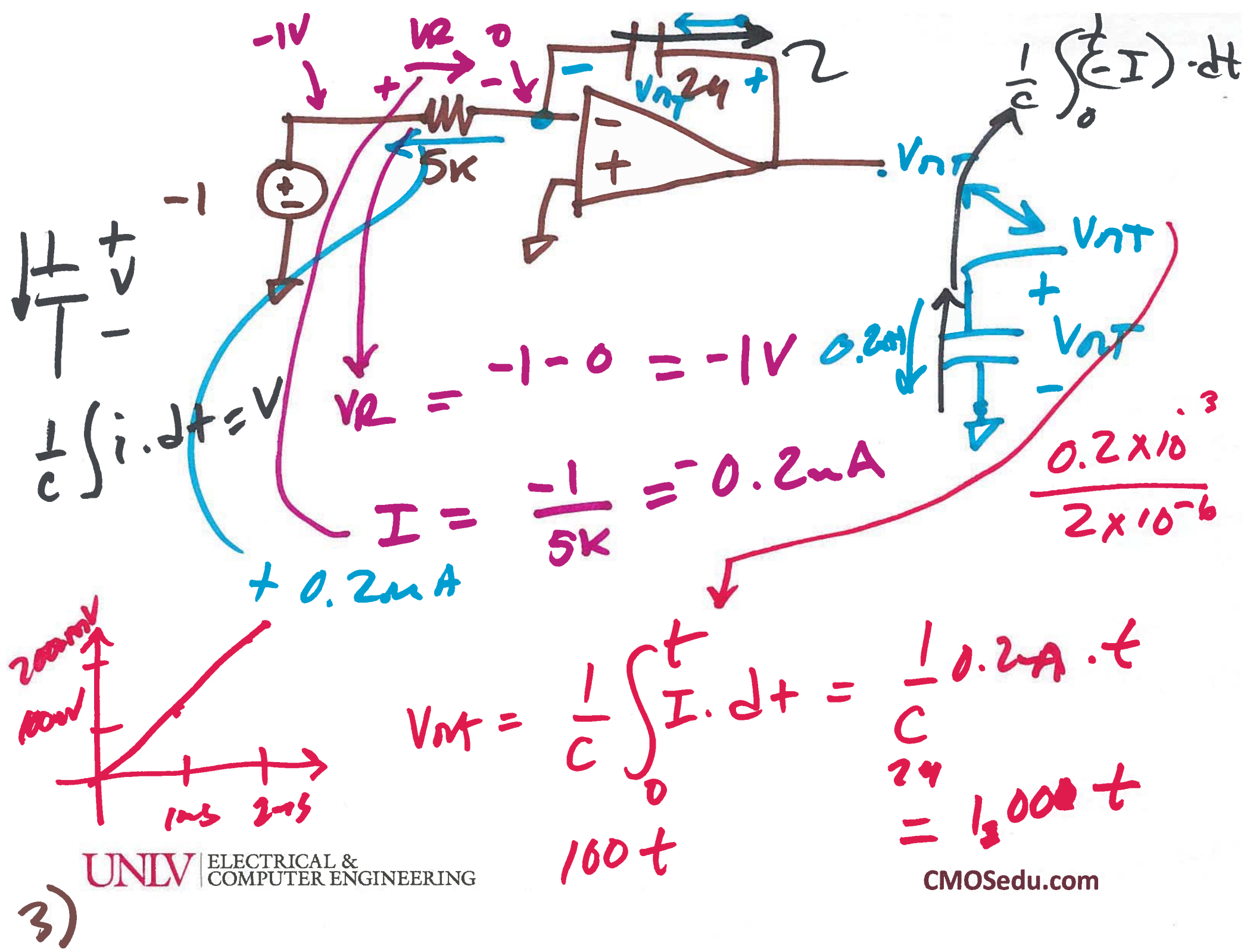
$$= 25fJ + 25fJ$$

$$\mathcal{E}_{Total} = 50fJ$$

$$\mathcal{E}_{final} = \frac{1}{2} 250ff \cdot 0.6^2 \quad \text{(new } V_{DT}\text{ equation)}$$

$$= 125..36$$

$$= \underline{45fF}$$



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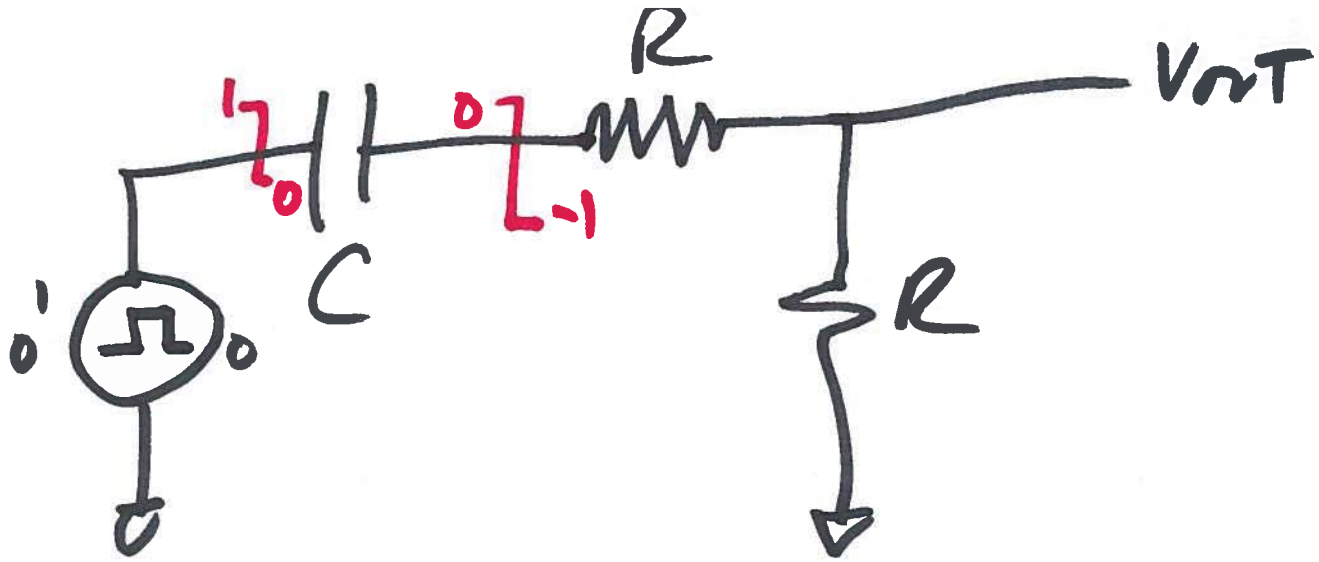
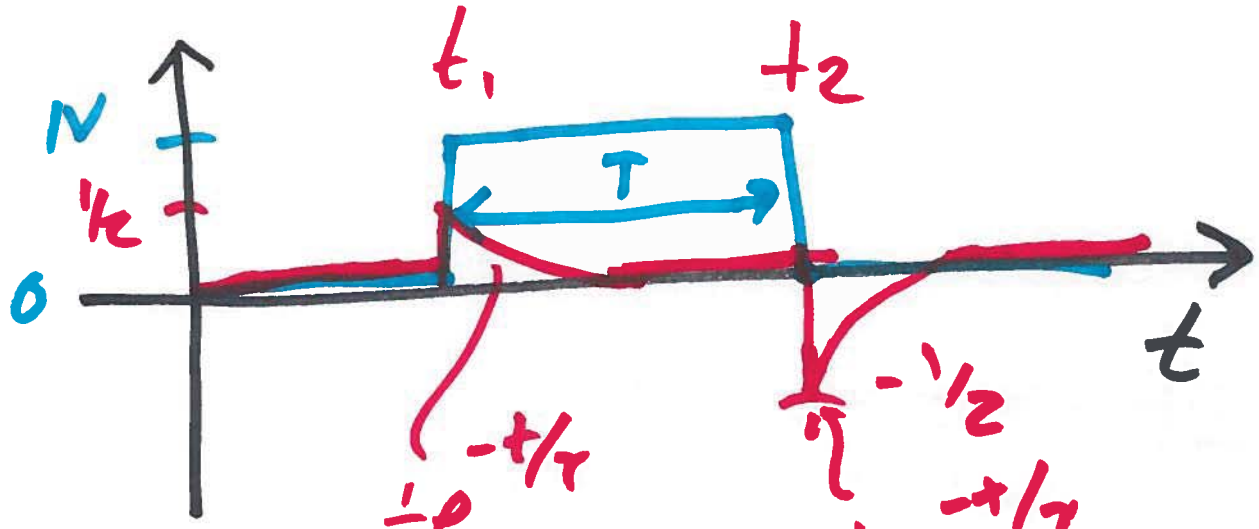
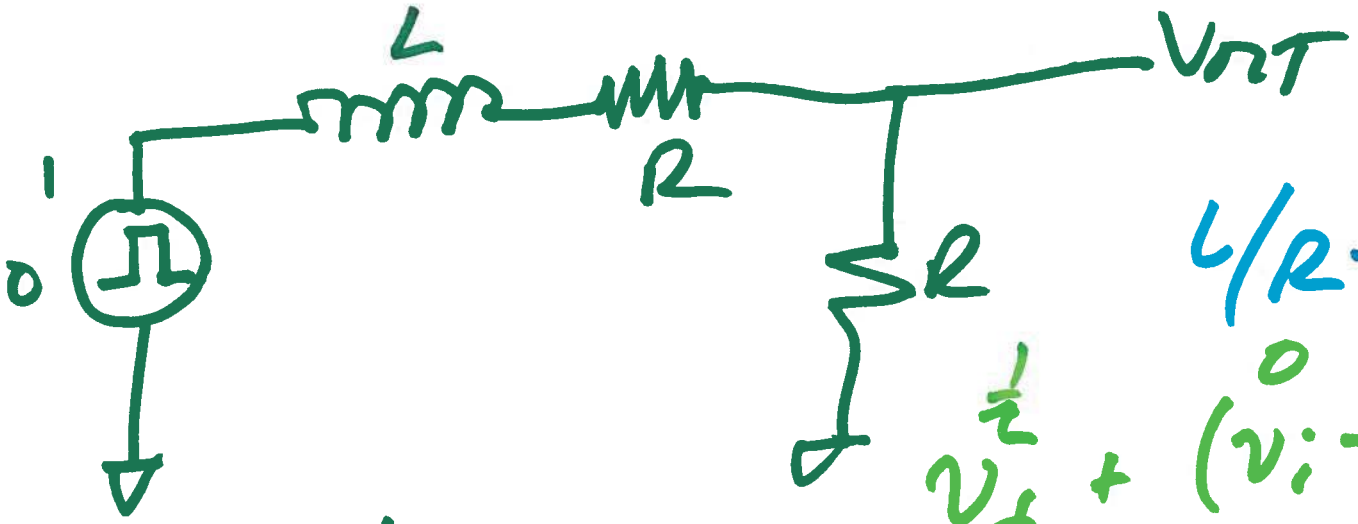
3)



$T >> RC$

$\tau = 2R \cdot C$





$L/R \cdot 2 = \tau$

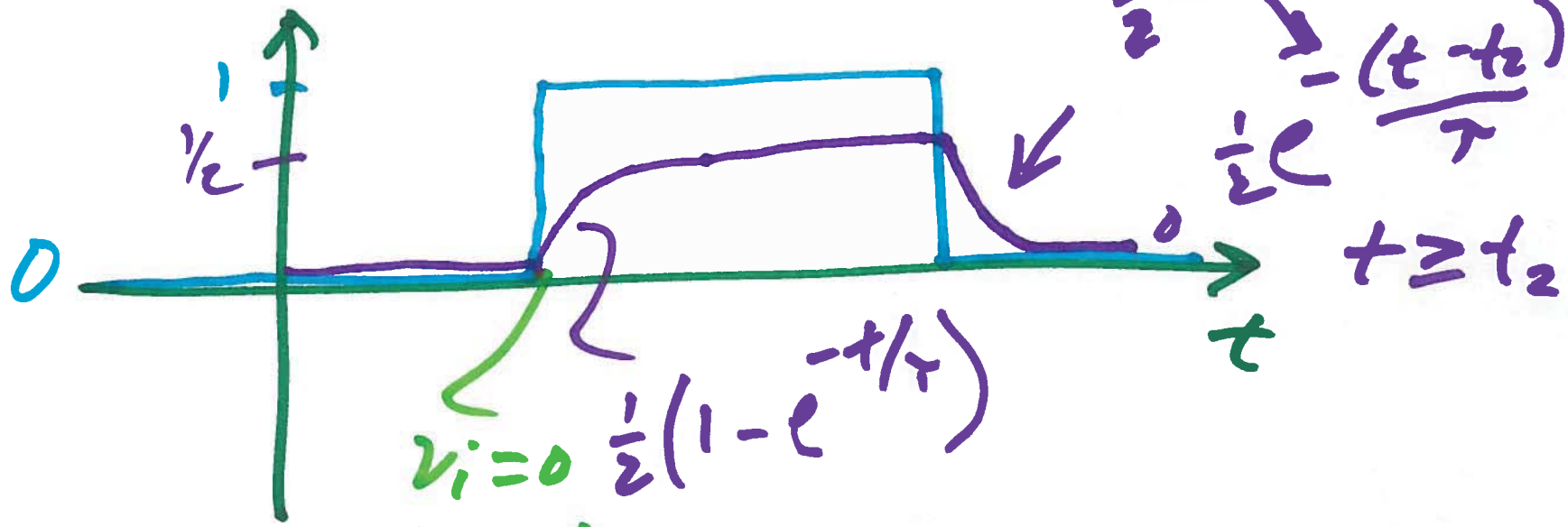
$v_f + (v_i - v_f)e^{-t/\tau}$

$v_f = 0$

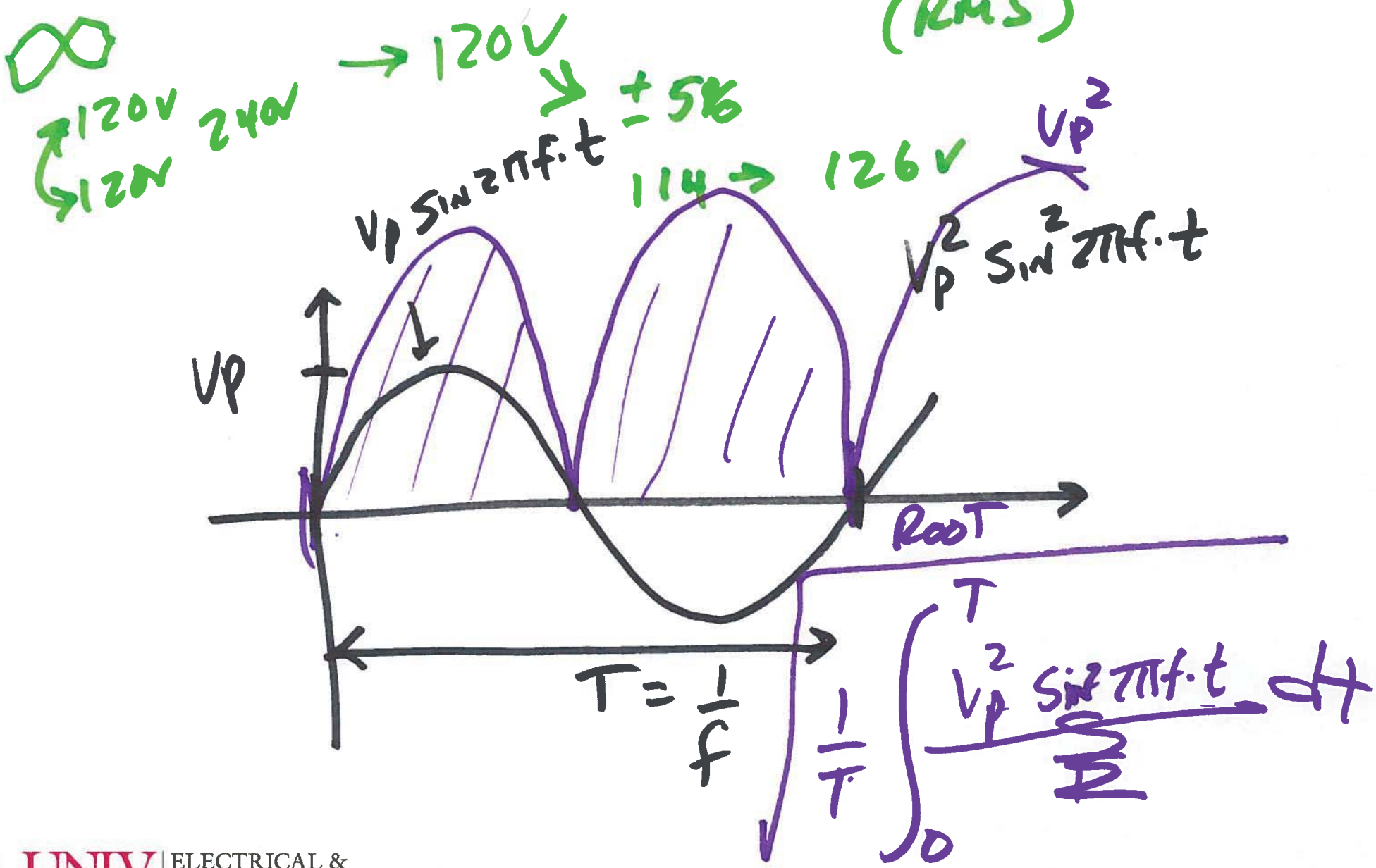
$v_i = \frac{1}{2}$

$\frac{1}{2}e^{-t/\tau}$

$T >> \frac{L}{2R}$



Root mean Square (RMS)



$$V_{RMS} = \sqrt{\frac{1}{T}\int_0^T V_p^2 \sin^2 2\pi f t \cdot dt}$$

$$\downarrow$$

$$= \sqrt{\frac{V_p^2}{2T}\int_0^T (1 - \cos 4\pi f t)\, dt}$$

$V_p = \sqrt{2} \cdot V_{RMS}$

$= \sqrt{2} \cdot 120V$

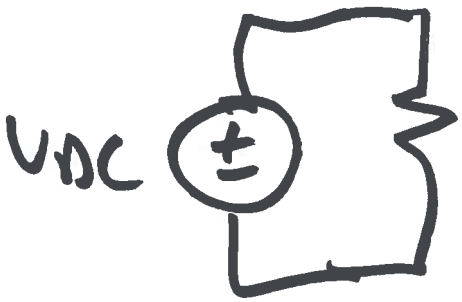
$\simeq 170V$

$340V$ peak-to-peak

$$= \sqrt{\frac{V_p^2}{2T}\left[\int_0^T dT - \int_0^T \cos 4\pi f t \cdot dT\right]}$$

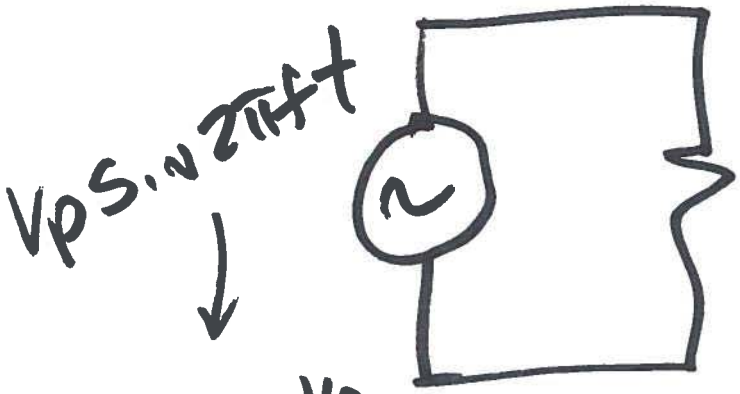
$f = \frac{1}{T}$

$$V_{RMS} = \frac{V_p}{\sqrt{2}}$$



$$P_R = \frac{V_{DC}^2}{R} = I^2 R$$

$$\downarrow I = \frac{V_{DC}}{R}$$



$$V_{rms} = \frac{V_p}{\sqrt{2}}$$

$$R,\ P_R = \frac{V_{rms}^2}{R}$$

$$\sqrt{\frac{1}{T}\int_0^T V_{DC}^2 \cdot dt}$$

$$\sqrt{\frac{1}{T} \cdot V_{DC}^2} = V_{DC}$$