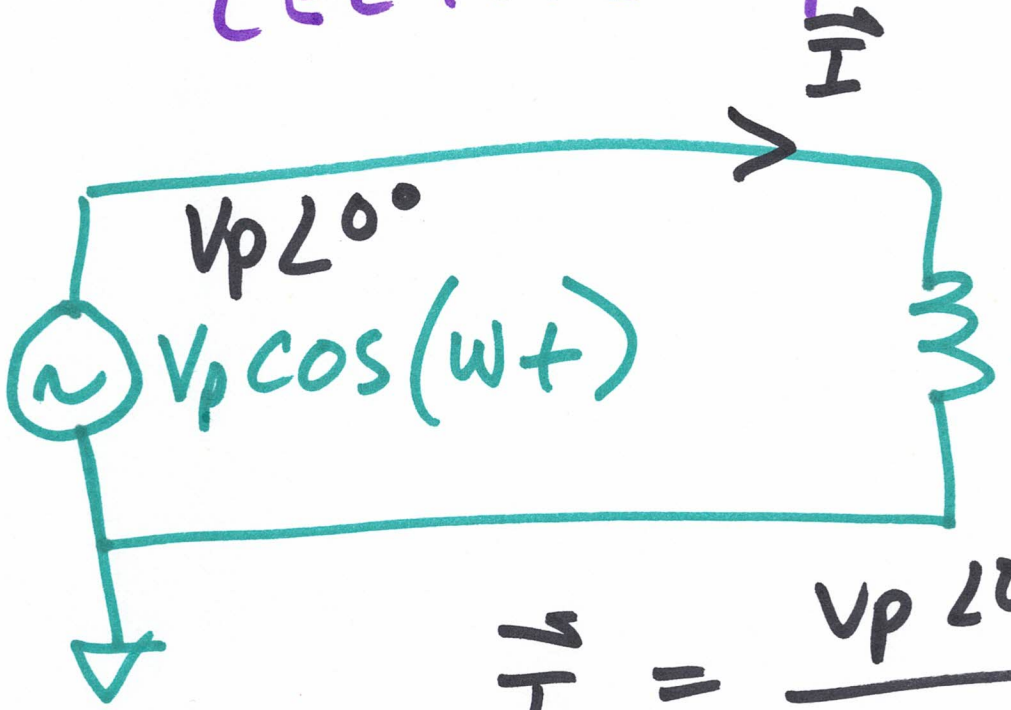
EE 221 circuits II

Feb. 24, 2020

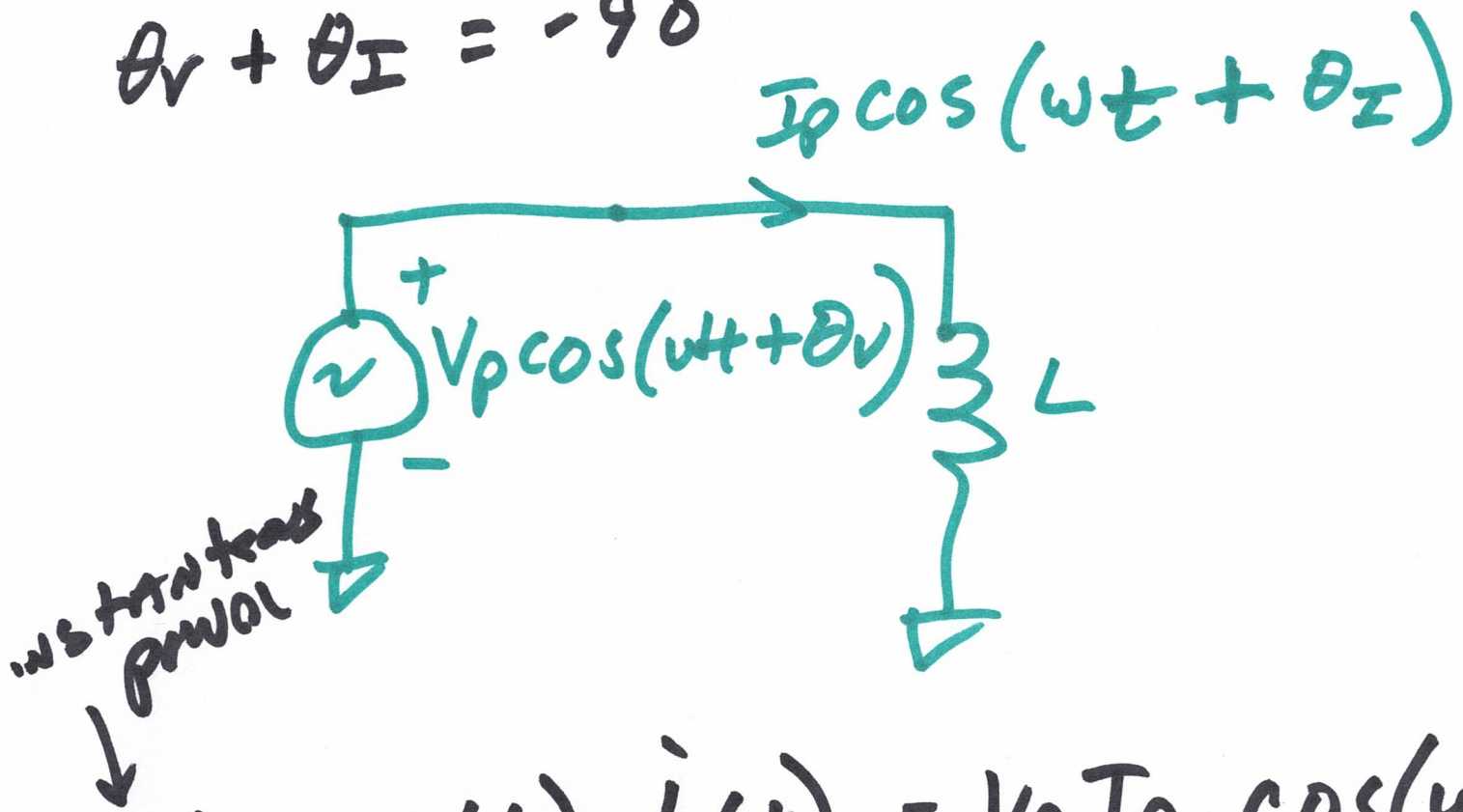
Lecture 9

$\omega t = 2\pi f \cdot t$



$$\bar{I} = \frac{V_p \angle 0^\circ}{\omega L \angle 90} = \frac{V_p}{\omega L} \angle -90$$

$\theta_V + \theta_I = -90^\circ$

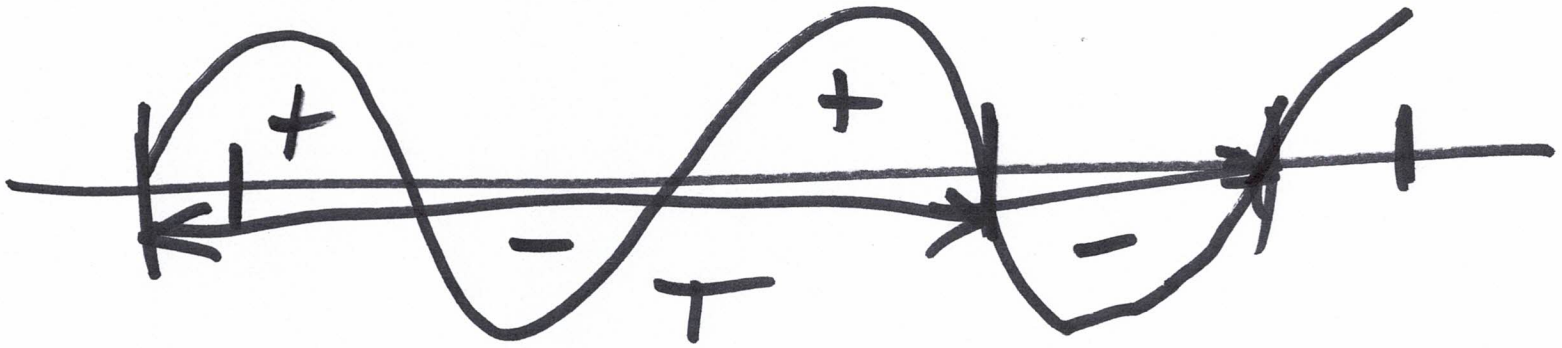


$$p(t) = v(t) \cdot i(t) = V_p I_p \cos(\omega t + \theta_V) \cdot \cos(\omega t + \theta_I)$$

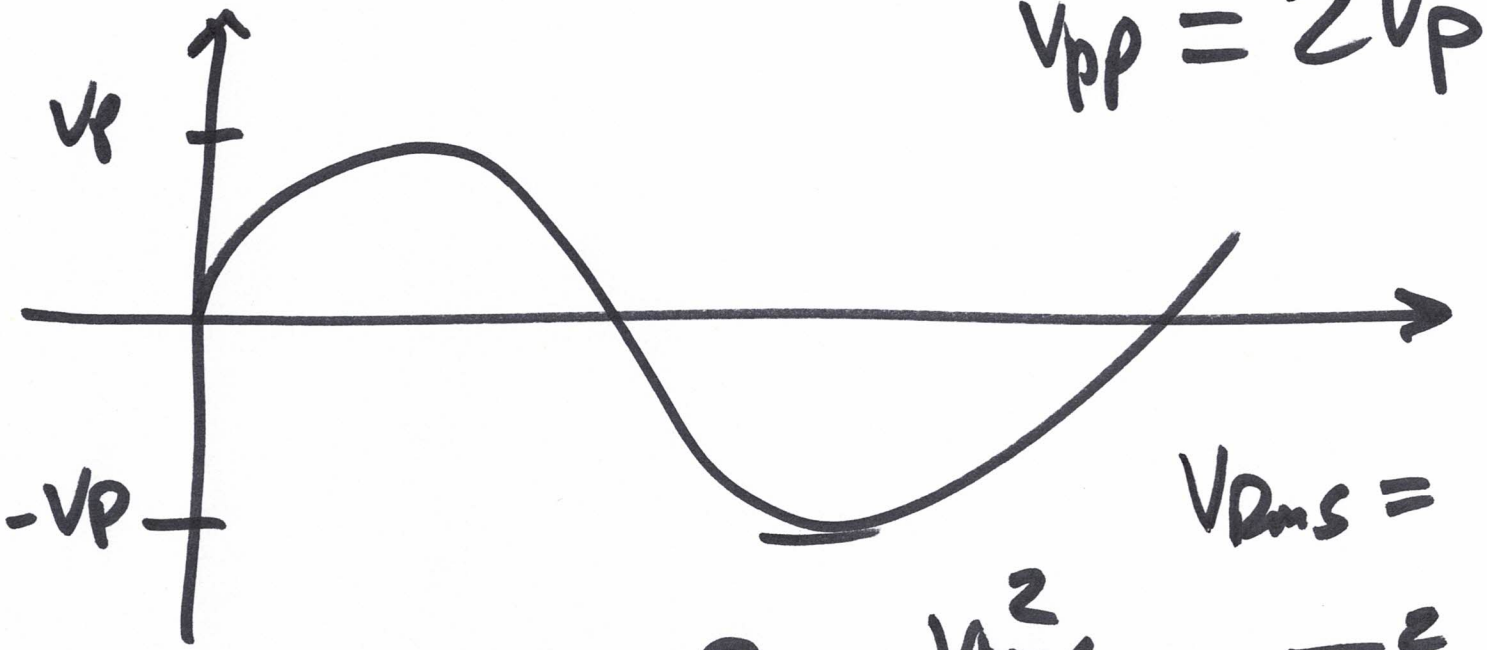
$$\cos a \cdot \cos b = \frac{1}{2}\left(\cos(a+b) + \cos(a-b)\right)$$

$$p(t) = \frac{V_p I_p}{2}\Big(\cos(2\omega t + \theta_V + \theta_I) + \cos(\omega t - \omega t + \theta_V - \theta_I)\Big)$$

$$P_{AVG} = \frac{1}{T}\int_{t_0}^{t_0+T} p(t)\cdot dt = \frac{1}{T}\int_0^T p(t)\cdot dt$$



$$V_{pp} = 2V_p = 2\sqrt{2}\,V_{Rms}$$

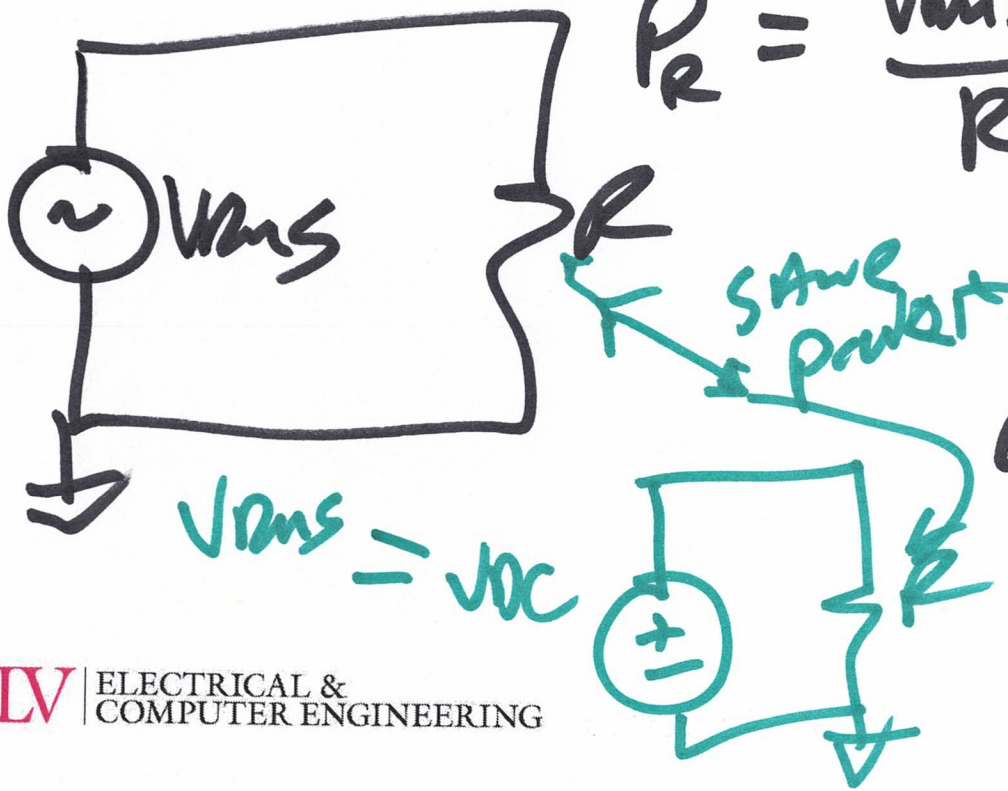


$$V_{Rms} = \frac{V_p}{\sqrt{2}}$$

$$P_R = \frac{V_{rms}^2}{R} = I_{Rrms}^2 \cdot R$$

$$= V_{rms} \cdot I_{rms}$$

only for resistors!



$$P_{AVG} = \frac{1}{T}\frac{V_p I_p}{2}\int_0^T \cos(\theta_V - \theta_I)\,dt$$

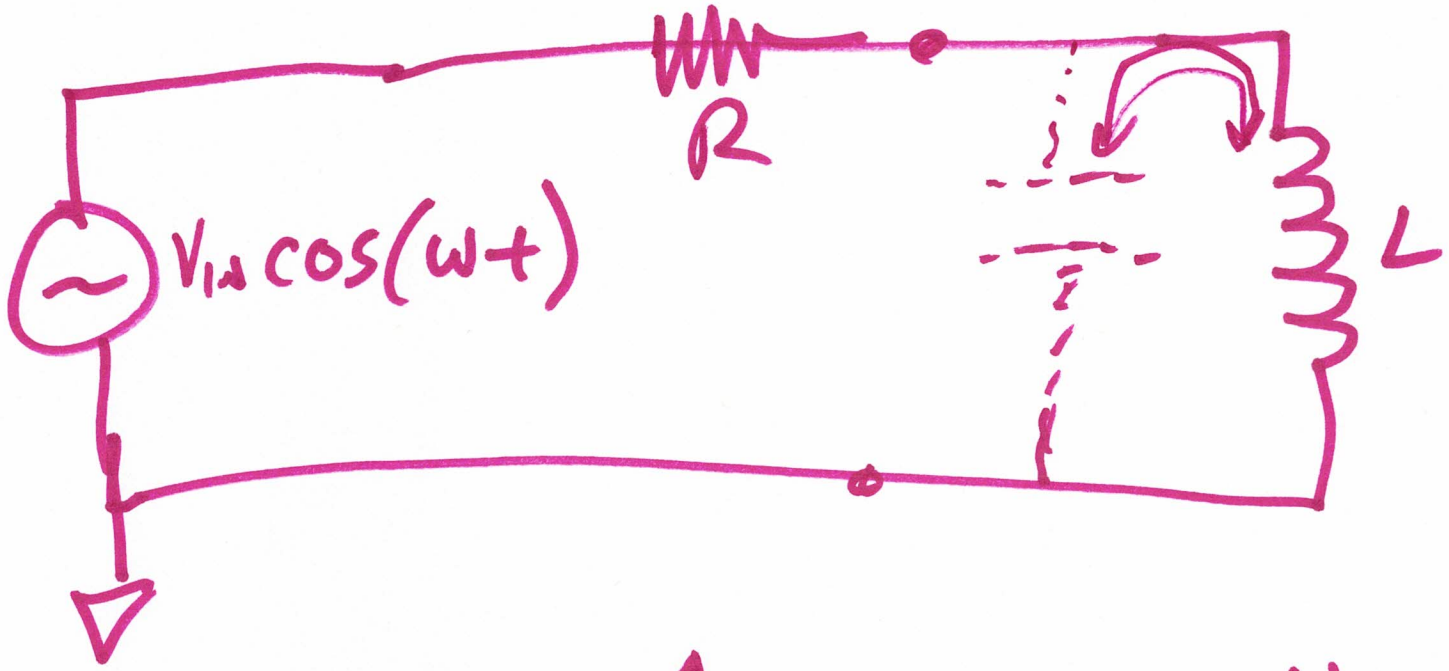
$$= \frac{V_p I_p}{2}\cos(\theta_V - \theta_I)\cdot\frac{1}{T}\int_0^T dt$$

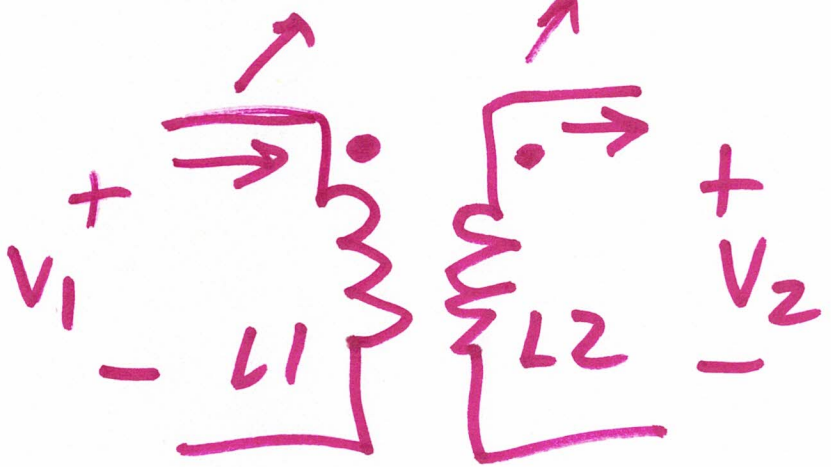
$$\frac{1}{T}(T-0)$$

$$P_{AVG} = \frac{V_p I_p}{2}\underbrace{\cos(\theta_V - \theta_I)}_{\text{p.f.}}$$

for ~~[illegible]~~ resistive loads

p.f. = 1

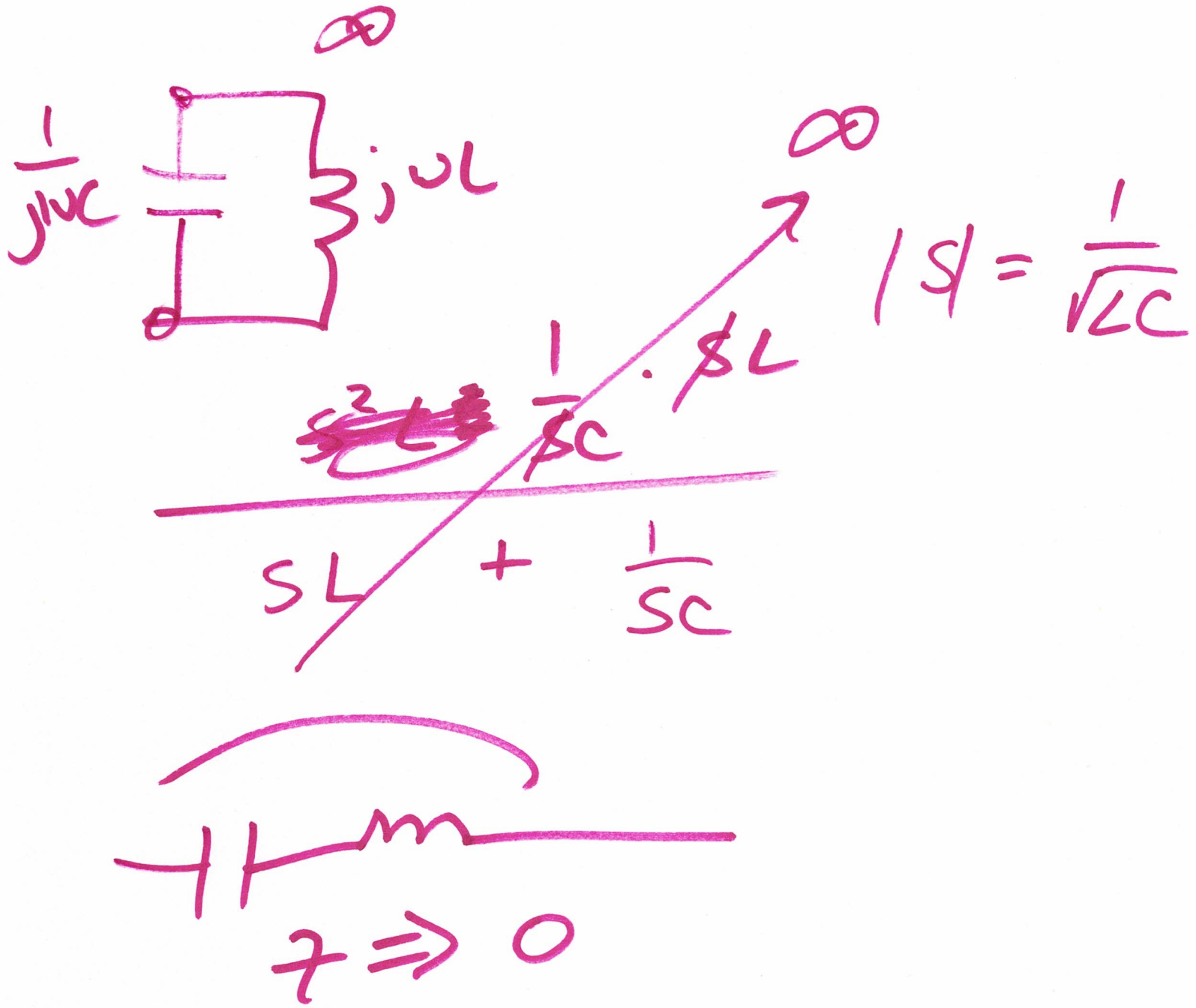




$$\frac{V_1}{V_2} = \frac{N_1}{N_2} = \sqrt{\frac{L_1}{L_2}}$$

$$\frac{V_1}{I_1} = \frac{V_2}{I_2}\frac{N_1^2}{N_2^2}$$

$$= \frac{L_1}{L_2}\underbrace{\frac{V_2}{I_2}}_{R_1}$$


∞
1/jωC
jωL
∞
|s| = 1/√LC
s²LC
1/sC · sL
sL + 1/sC
7 ⇒ 0