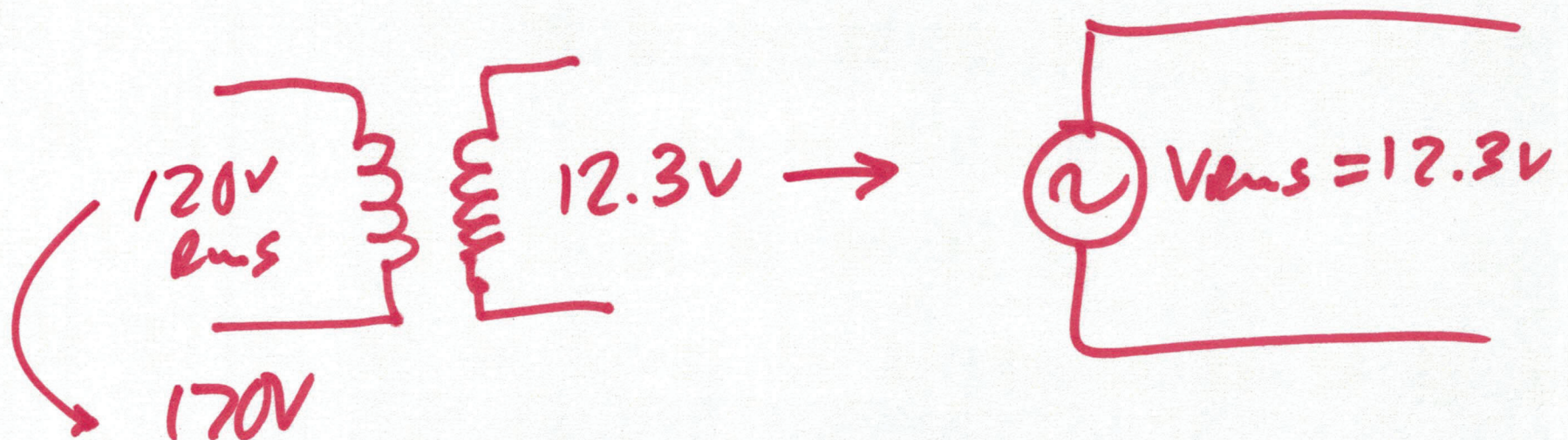


# EE 221 Circuits II

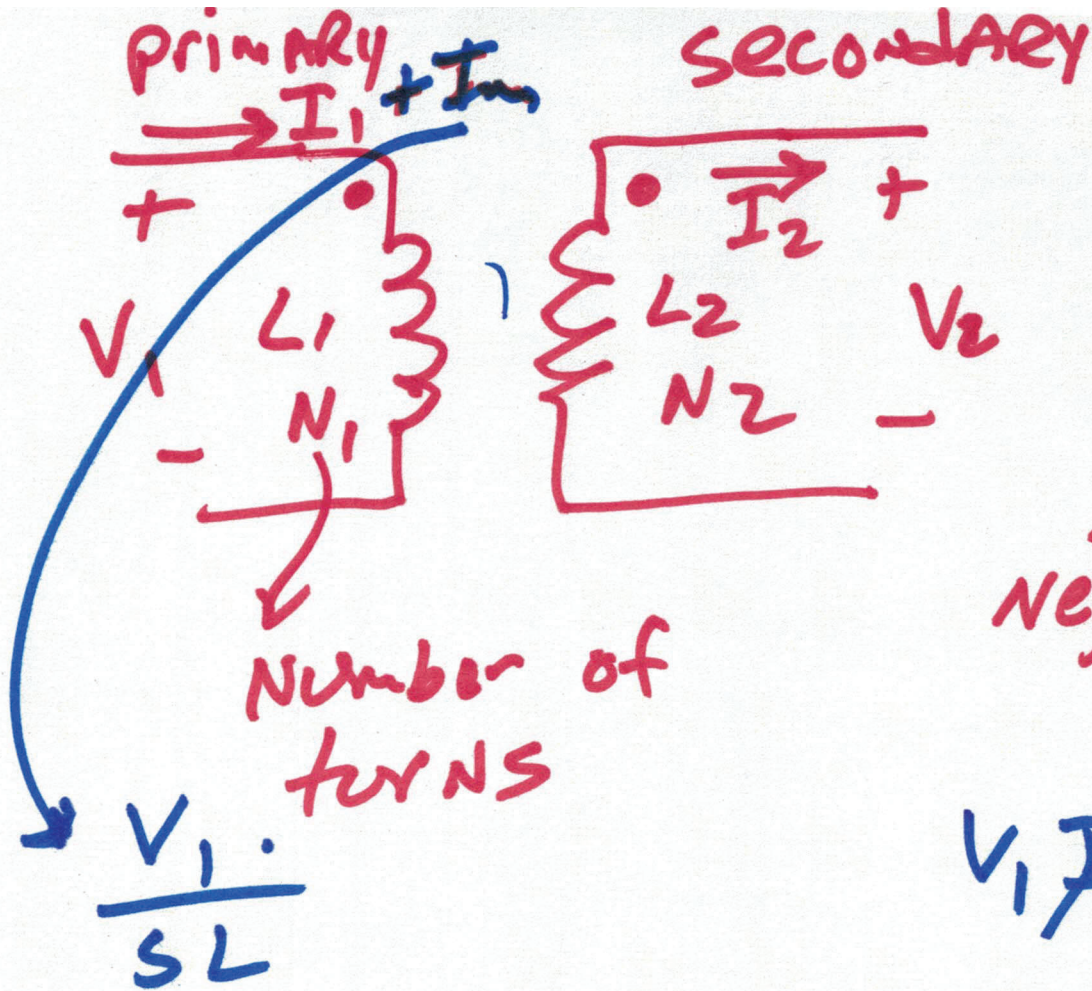
April 24, 2023

Lecture 24



$$170V = 120 \cdot \sqrt{2}$$

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

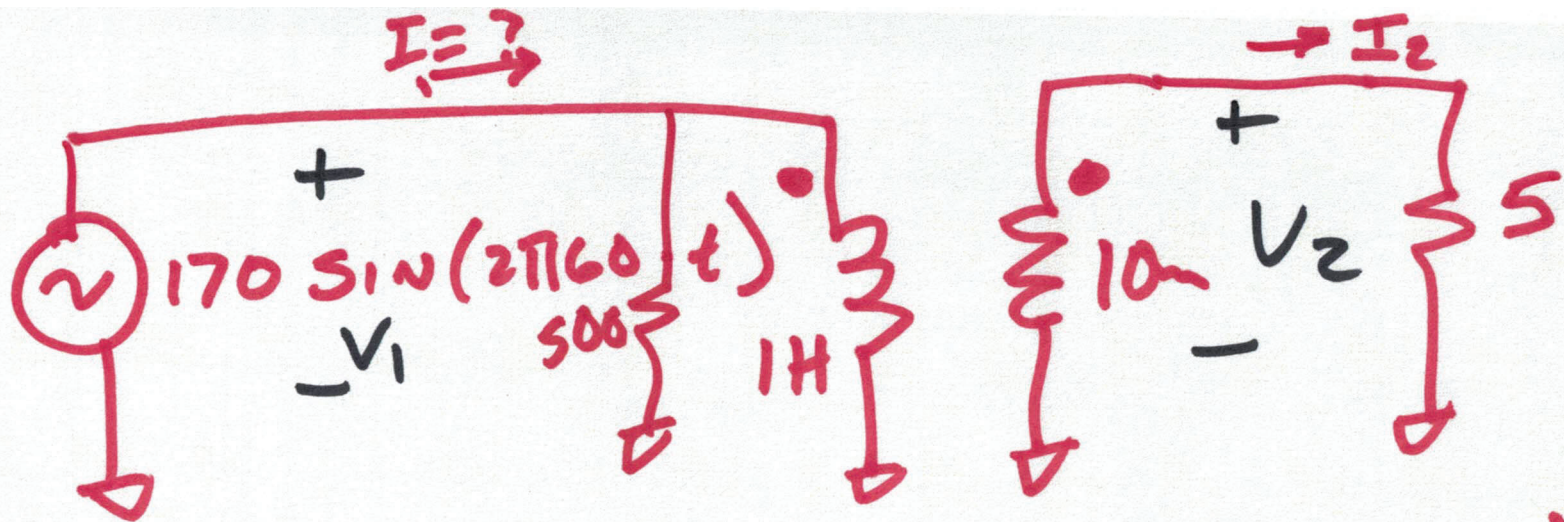


$$\frac{V_1}{V_2} = \frac{N_1}{N_2} = \frac{I_2}{I_1}$$

$$\uparrow = \sqrt{\frac{L_1}{L_2}}$$

neglects magnetizing current

$$V_1 I_1 = V_2 I_2$$



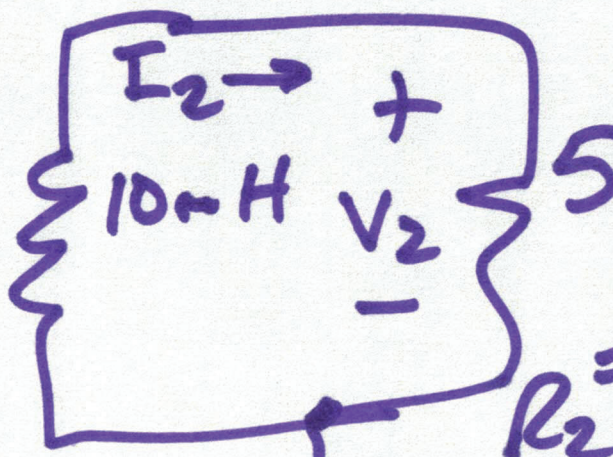
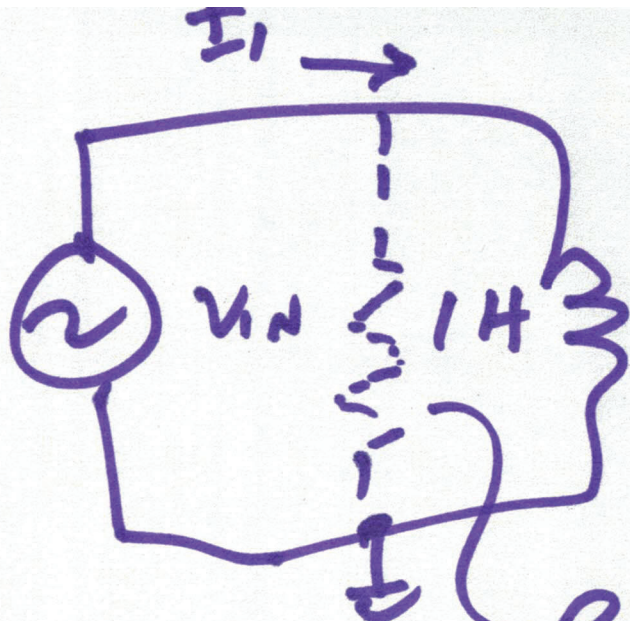
$$\frac{V_1}{V_2} = \frac{I_2}{I_1} = \sqrt{\frac{L_1}{L_2}} = \frac{N_1}{N_2}$$

$$I_2 = \frac{V_2}{5}$$

$$\frac{V_1}{V_2} = \frac{V_2/5}{I_1} = \sqrt{\frac{1}{.01}} = 10$$

$$V_2 = \frac{V_1}{10} = \frac{170}{10} = 17V$$

$$= \frac{17/5}{10} = I_1 = 0.34$$



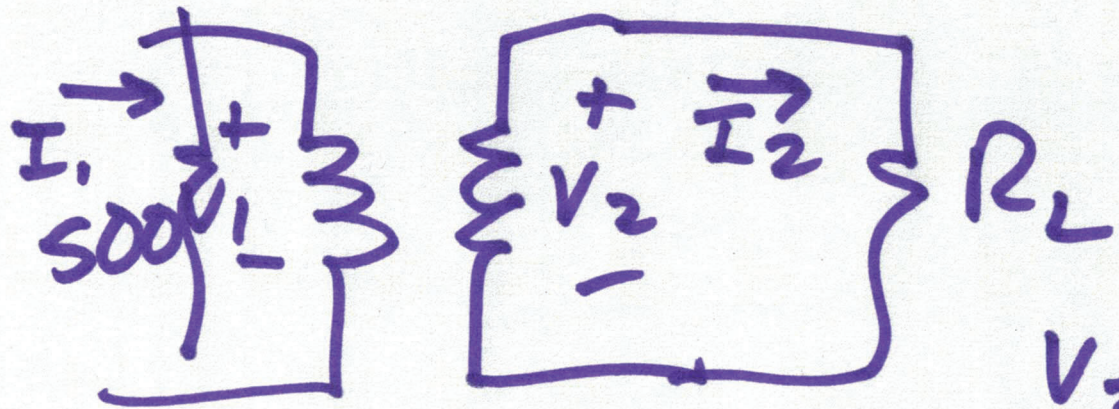
$$V_1 = \frac{N_1}{N_2} V_2$$

$$R_1 = \frac{V_1}{I_1} = \frac{\frac{N_1}{N_2} \cdot V_2}{\frac{N_2}{N_1} \cdot I_2} = \frac{N_1^2}{N_2^2} \cdot \frac{V_2}{I_2}$$

$$I_2 = \frac{N_1}{N_2} I_1$$

$$R_2 = \frac{1}{100} \cdot R_{eq1} \rightarrow R_1 = 500$$

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



$$\frac{V_2}{I_2} = R_L$$

$$L_1 = 1$$

$$L_2 = 0.01$$

$$V_2 = \frac{N_2}{N_1} \cdot V_1$$

$$\frac{V_1 \cdot \frac{N_2}{N_1}}{I_1 \cdot \frac{N_1}{N_2}} = R_L$$

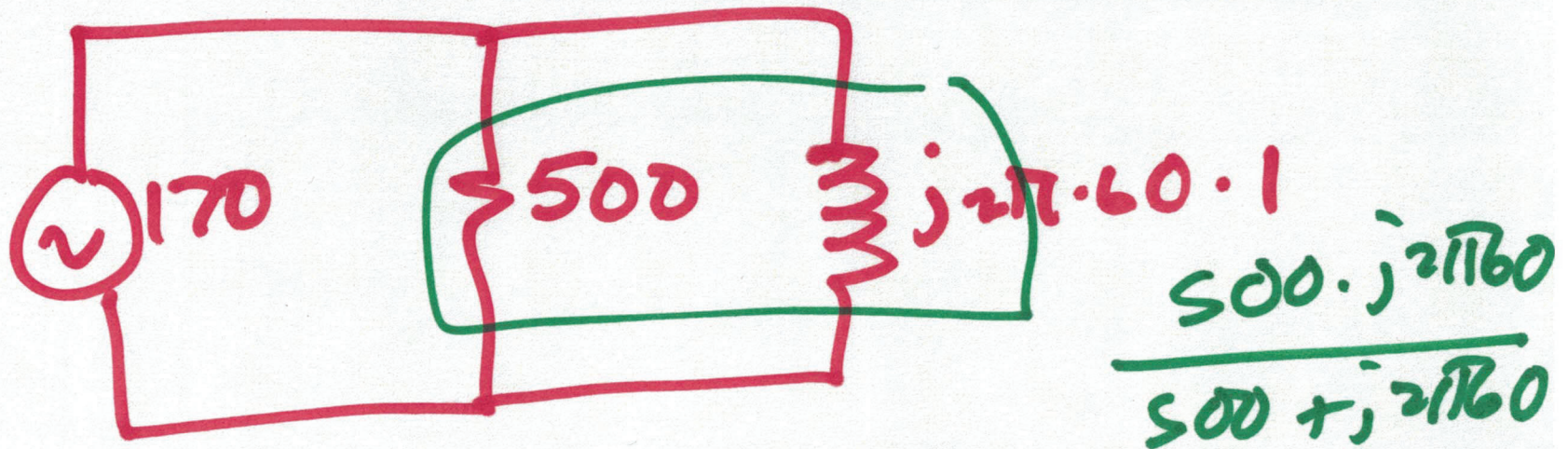
$$I_2 = \frac{N_1}{N_2} \cdot I_1$$

$$R_{in} = R_L \cdot \left( \frac{N_1}{N_2} \right)^2 \frac{V_1}{I_1} = R_{in} = \left( \frac{N_1}{N_2} \right)^2 R_L = \left( \sqrt{\frac{L_1}{L_2}} \right)^2$$

$$= R_L \cdot \left( \sqrt{\frac{1}{0.01}} \right)^2$$

$$R_L \cdot 100 = 500$$

5)



$$I = \frac{170}{500 + j \cdot 2\pi \cdot 60 \cdot 1}$$

$$|I| = \frac{170}{\sqrt{500^2 + (2\pi 60)^2}}$$

$$\angle \theta = \tan^{-1} \frac{2\pi 60}{500}$$

$$I = |I| \cdot \sin(2\pi ft + \theta)$$