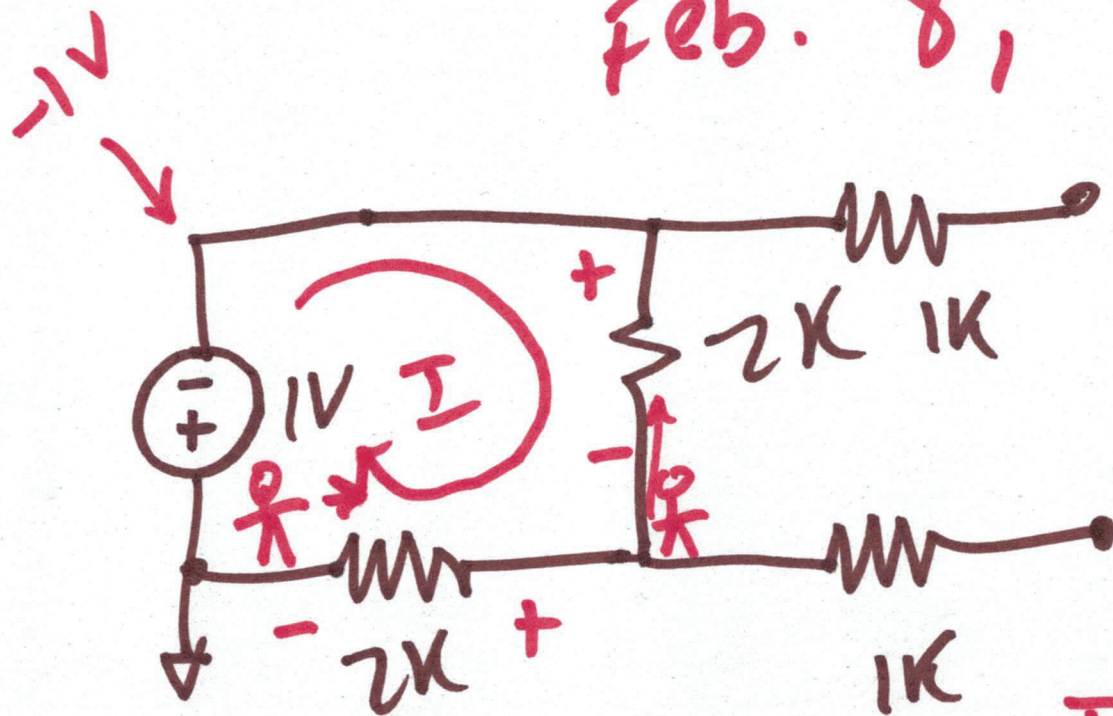


EE 221 Circuits II

Lecture 6

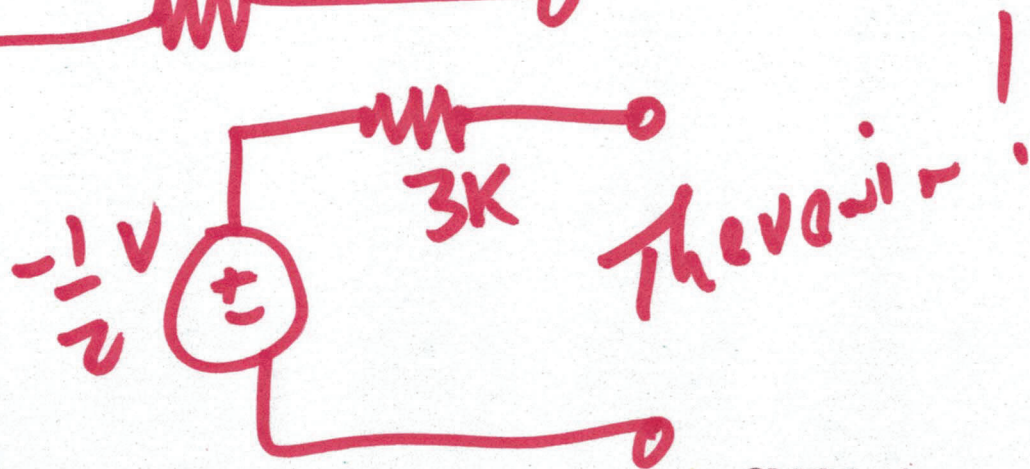
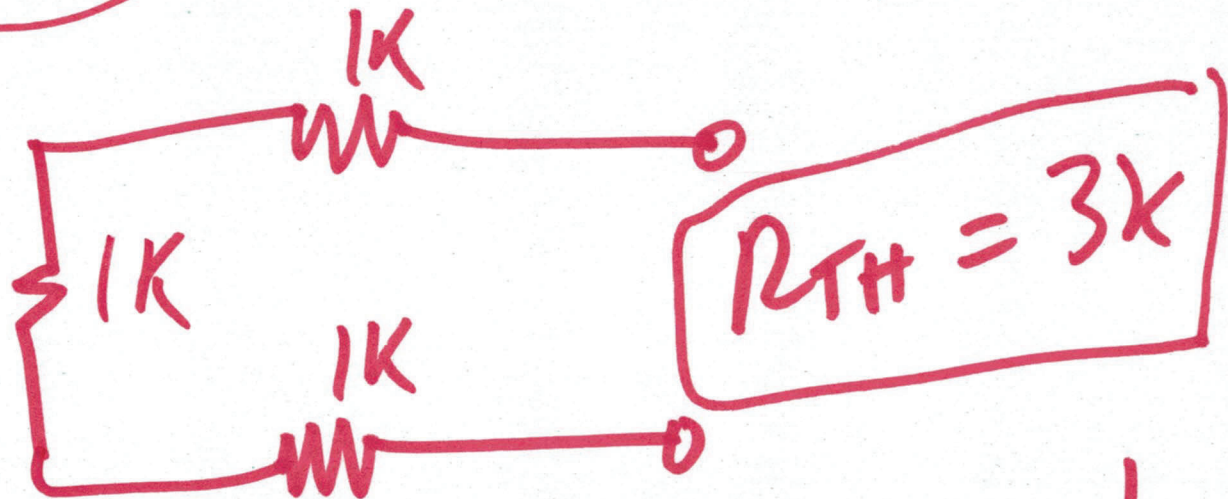
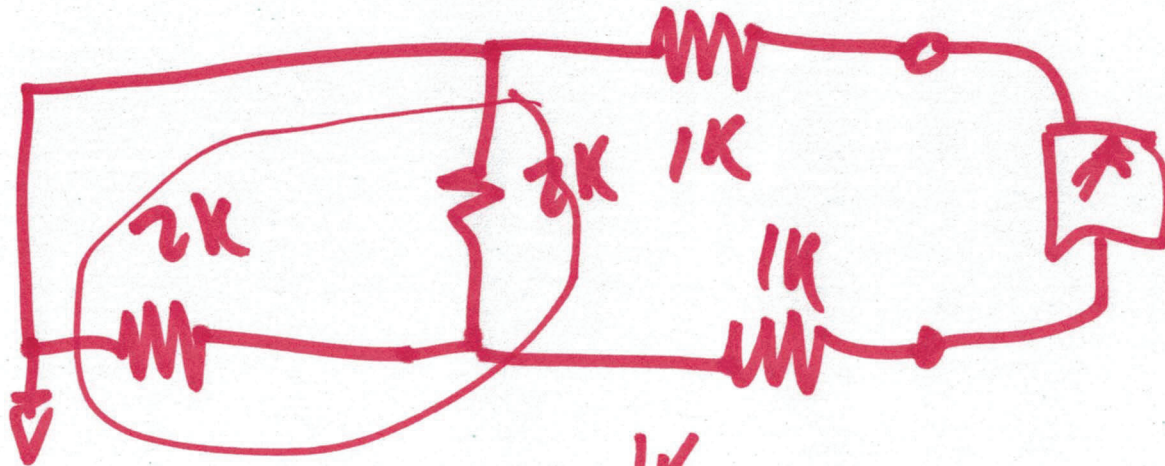
Feb. 8, 2021

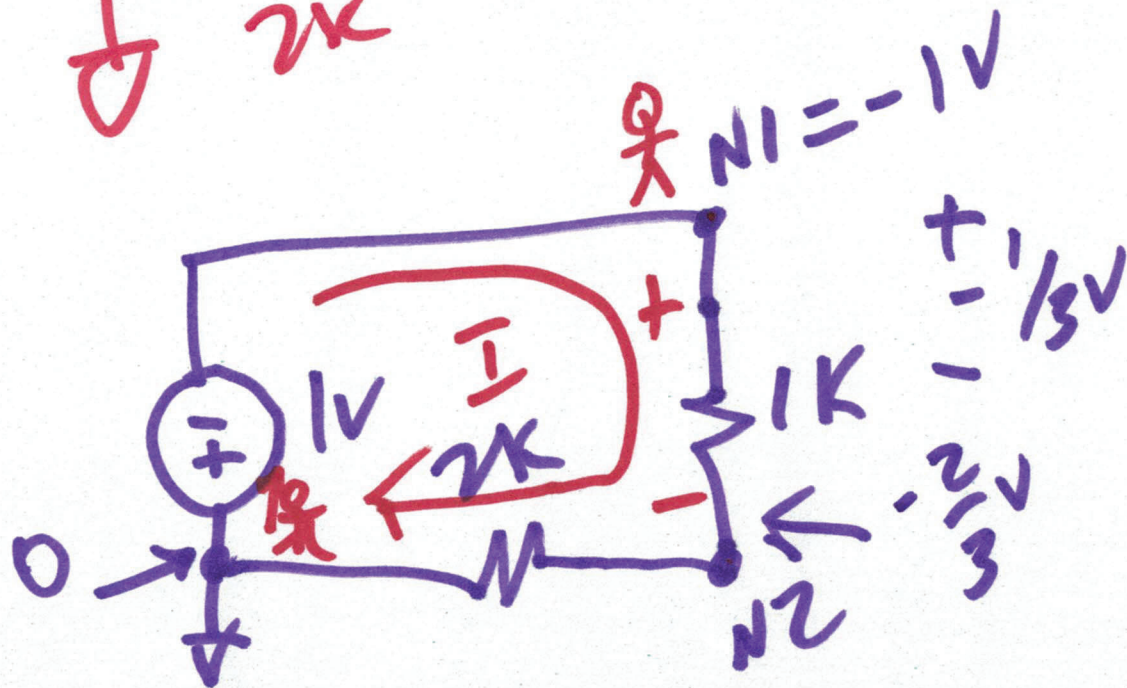
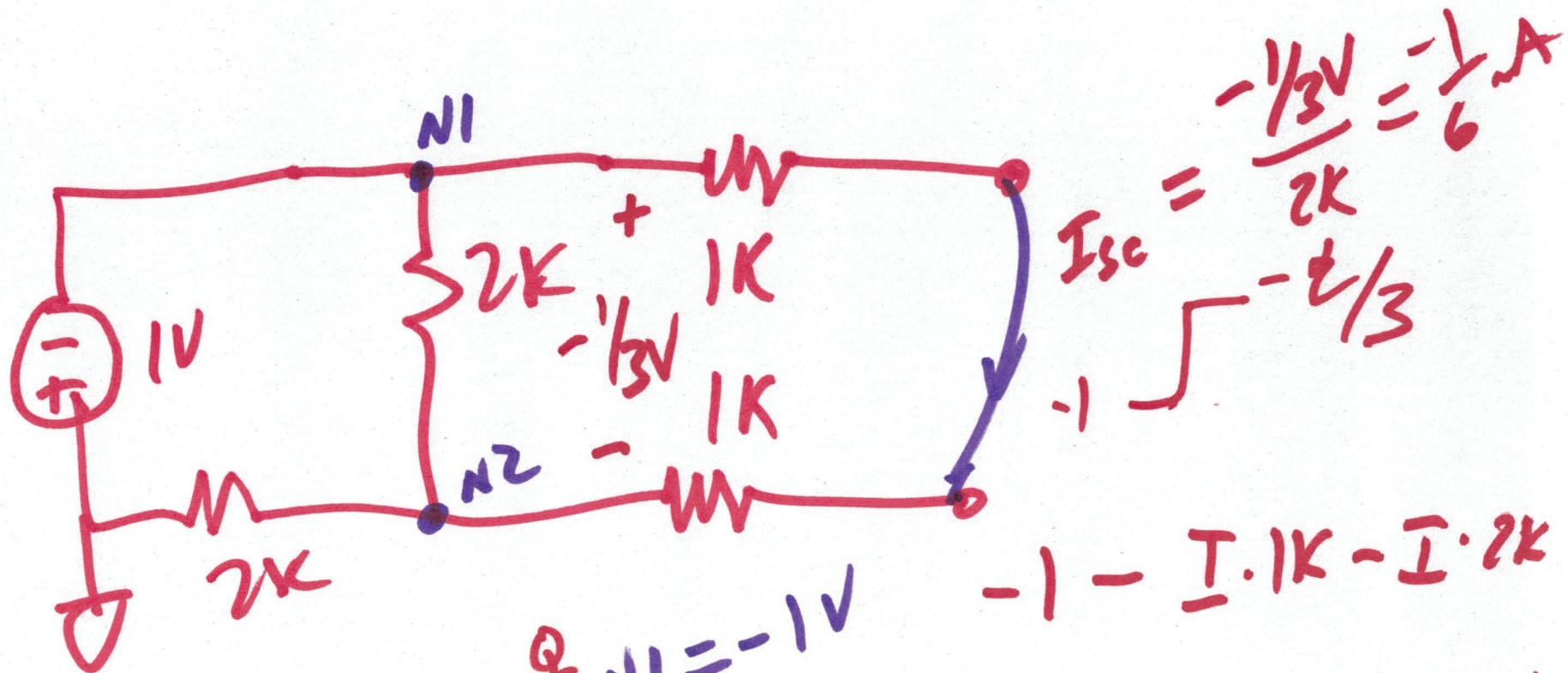


$$2kI + 2kI + 1V = 0$$

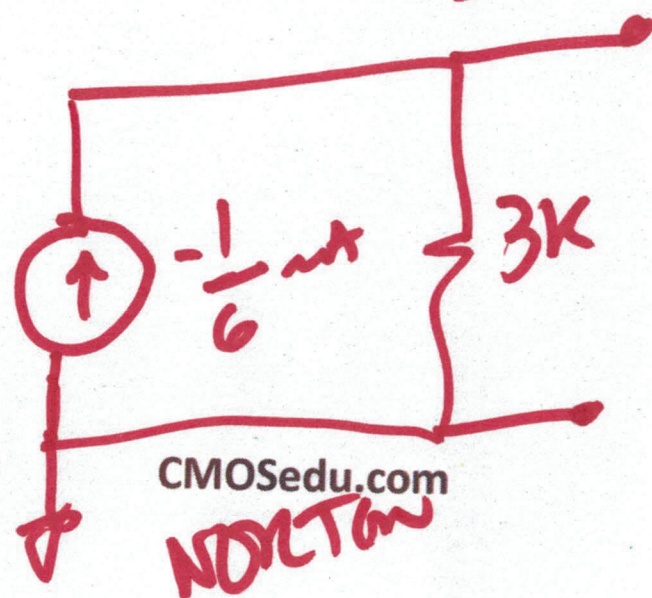
$$I = -\frac{1}{4} \text{ mA}$$

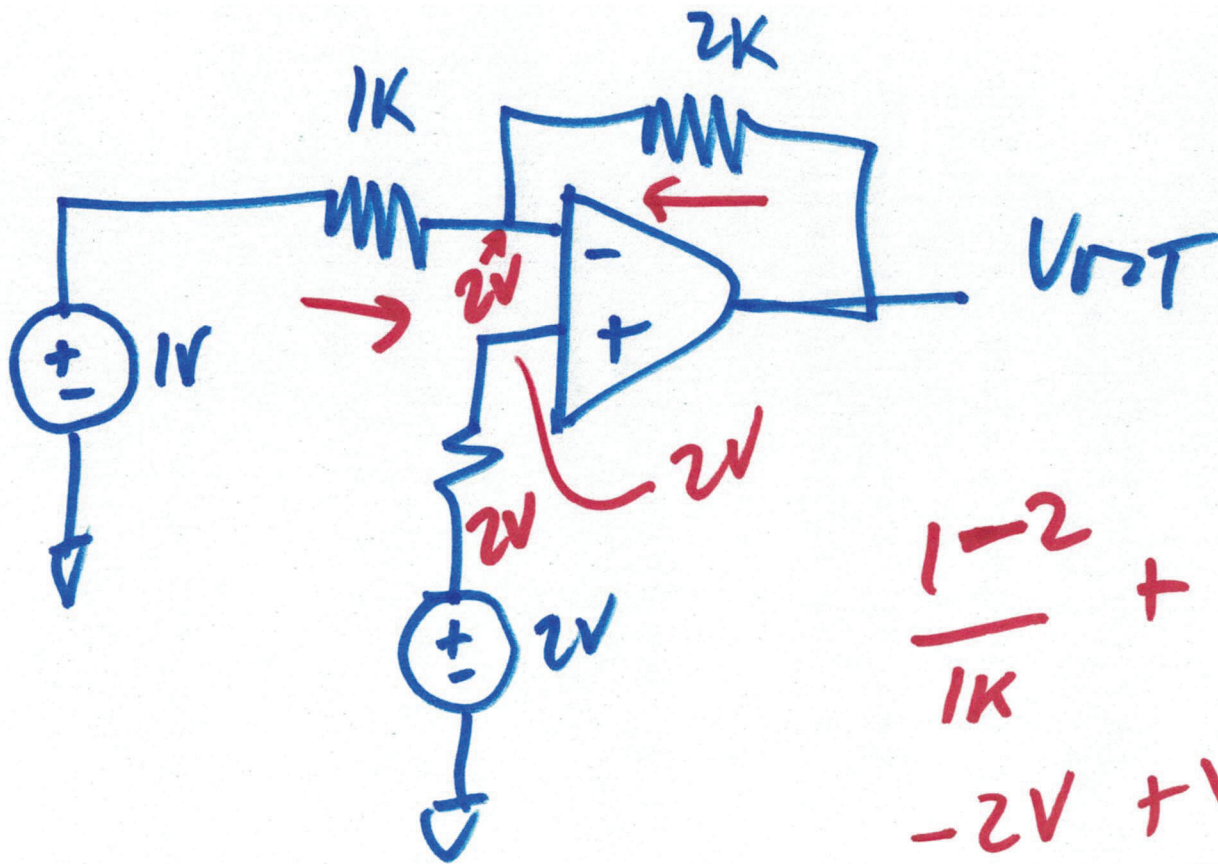
$$I \cdot 2k = -\frac{1}{4} \text{ mA} \cdot 2k = -\frac{1}{2} \text{ V} = V_{\text{TH}}$$





$$I = -\frac{1}{3} mA$$



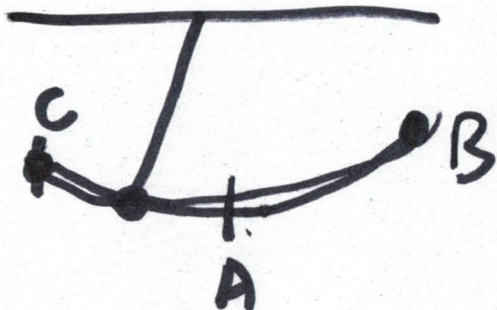


$$\frac{1-2}{1K} + \frac{V_{out}-2}{2K} = 0$$

$$-2V + V_{out} - 2 = 0$$

$$V_{out} = 4V$$

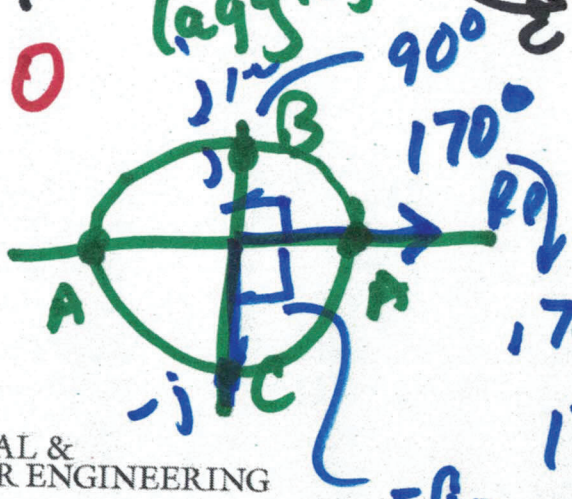
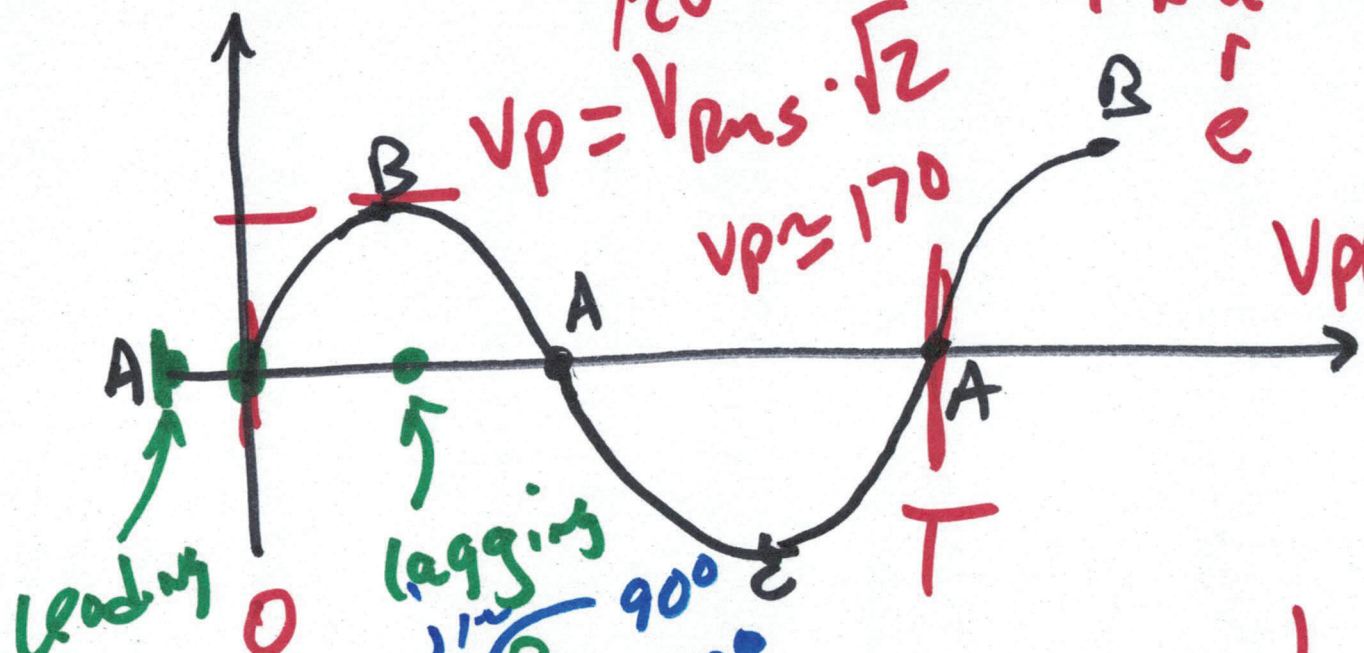
4)



120 → RMS
0.707
TNA
re

$V_p = V_{rms} \cdot \sqrt{2}$
 $V_p \approx 170$

$V_{pp} \approx 340V$

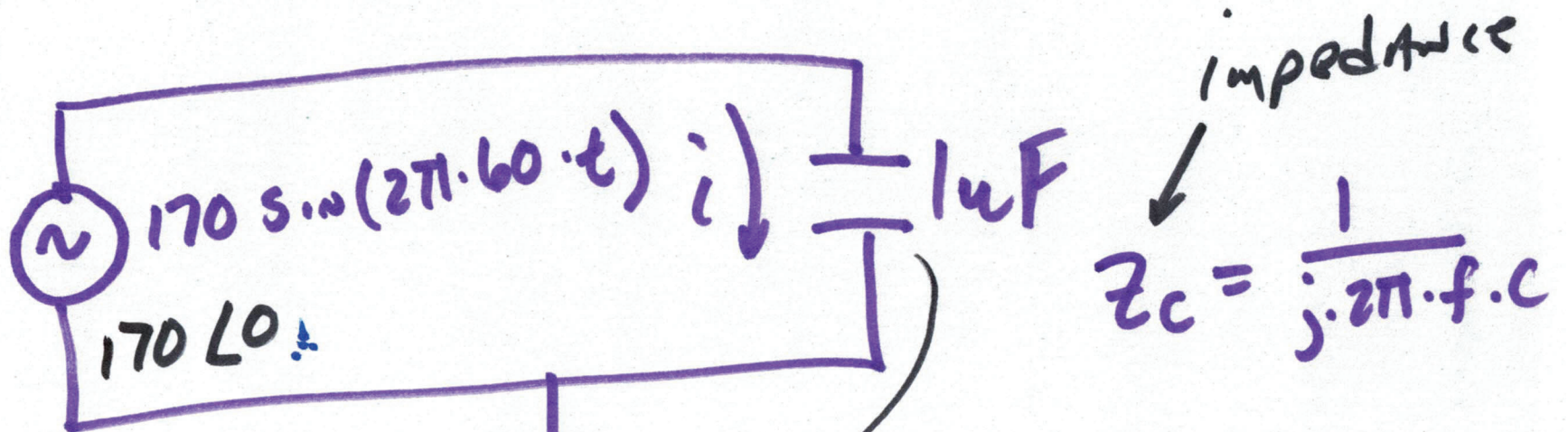


$f = \frac{1}{T} = 60 \text{ Hz}$

$T = 16.7 \text{ ms}$

$170 \angle 0$
 $170 + j \cdot 0$
 $-90 = 270$

5)



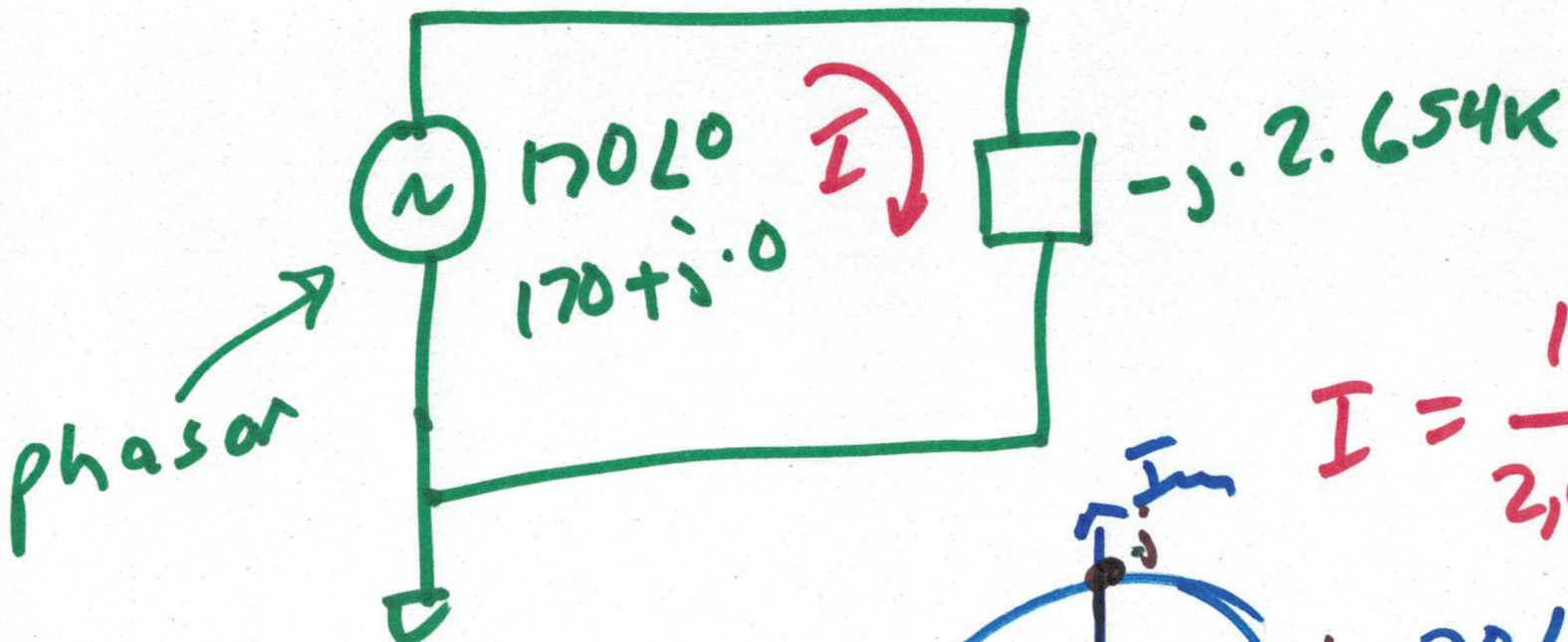
$$i = \sqrt{-1}$$

$$j = \sqrt{-1}$$

$$\sqrt{-1} \cdot \sqrt{-1} = -1$$

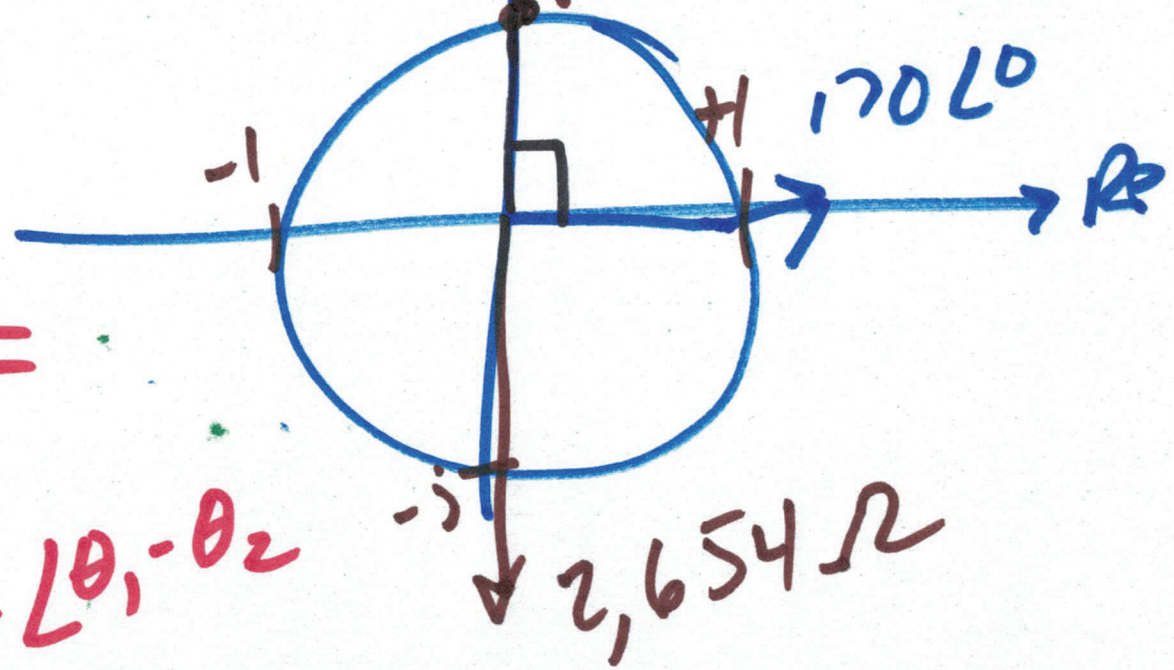
$$\begin{aligned}
 &= \frac{1}{j \cdot 2\pi \cdot 60 \cdot 10^{-6}} \\
 &= \frac{1}{j} \\
 &= -j
 \end{aligned}$$

$$Z_c = -j 2.654 \text{ K}$$



$$I = \frac{170 \angle 0}{2,654 \angle -90}$$

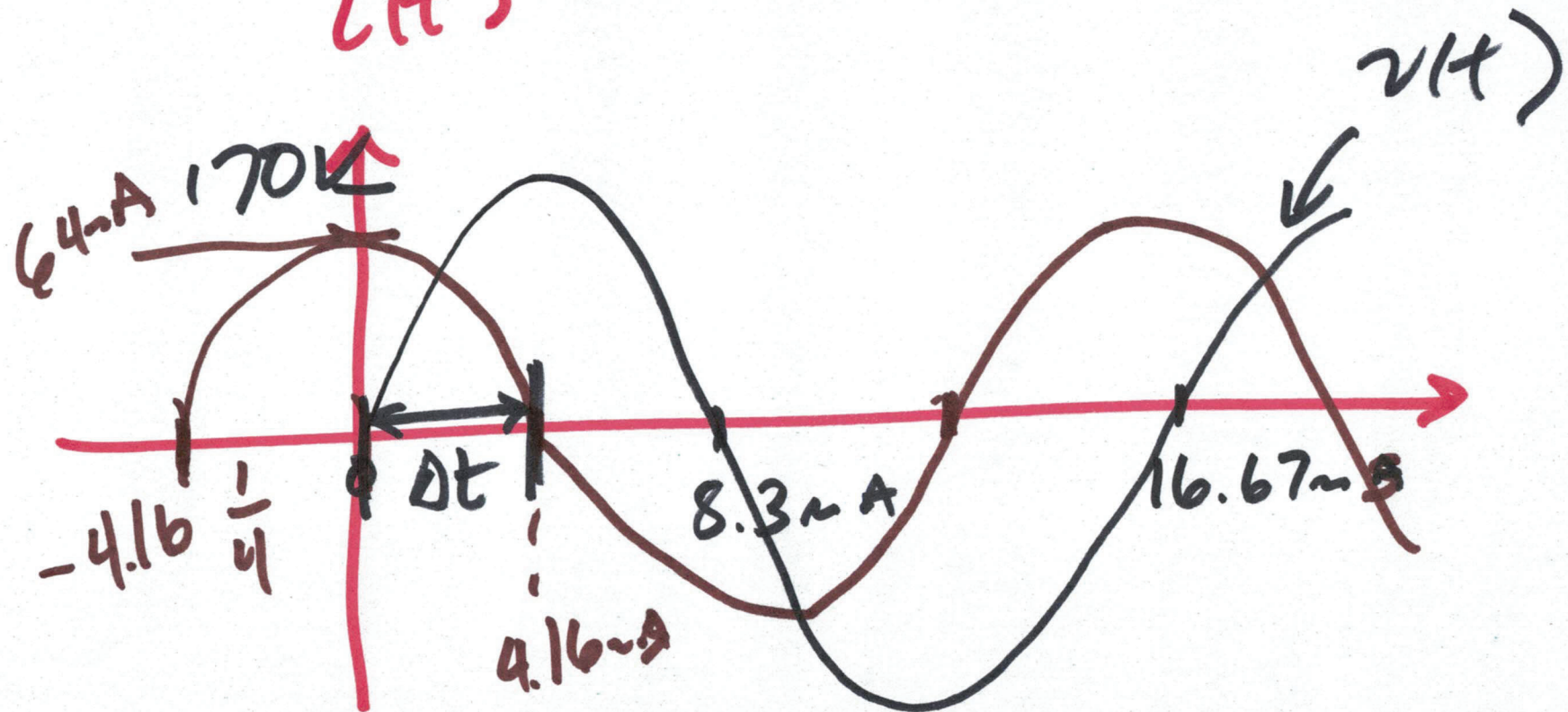
$$\frac{A \angle \theta_1}{B \angle \theta_2} = \frac{A}{B} \angle \theta_1 - \theta_2$$



$$I = 64 \mu\text{A} \angle 90^\circ$$

$$v(t) = 170 \sin(2\pi 60 \cdot t)$$

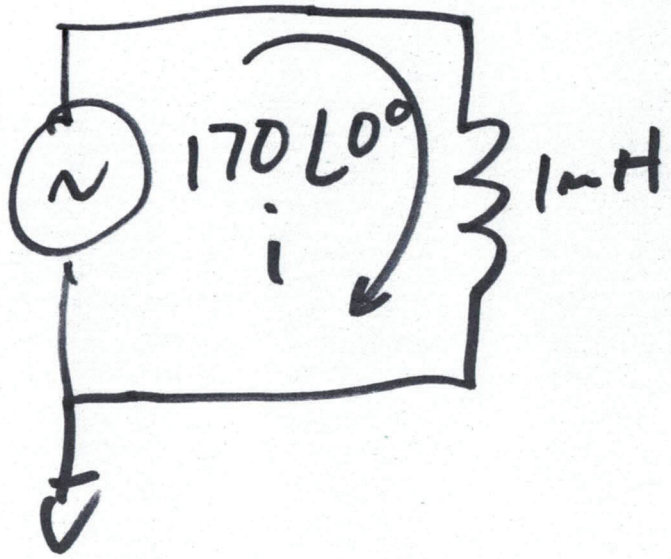
$$i(t) = 64 \mu\text{A} \sin(2\pi 60 \cdot t + 90^\circ)$$



8)

$$\theta = \frac{\Delta t}{T} \cdot 360$$

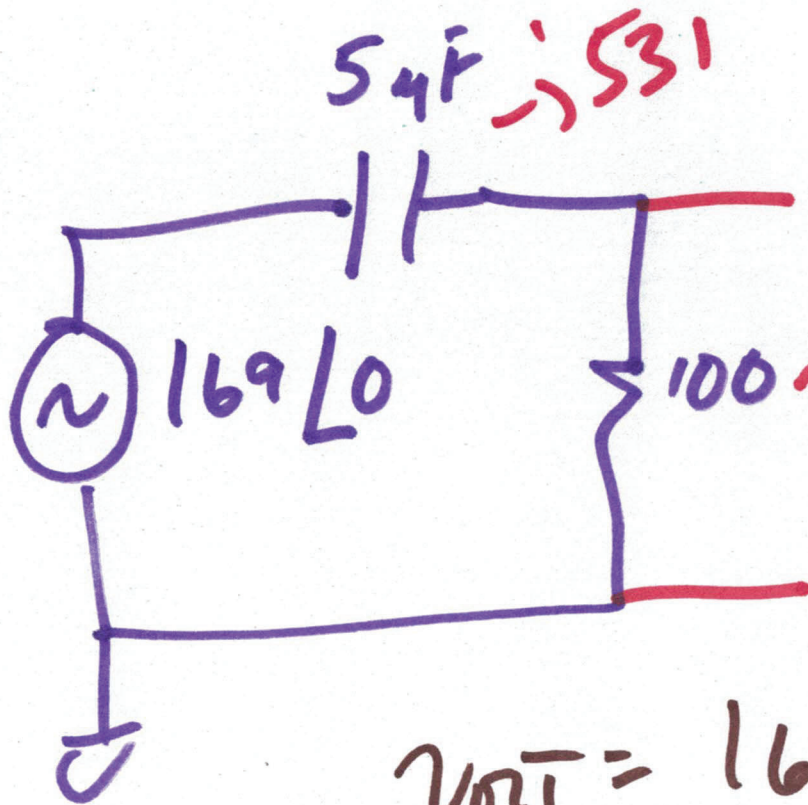
$$90 = \frac{\Delta t = T/4}{T} \cdot 360$$



$$i = ?$$

$$\begin{aligned} Z_L &= j\omega L \\ &= j \cdot 2\pi \cdot 60 \cdot 10^{-3} \\ &= j \cdot 0.377 \Omega \end{aligned}$$

$$i = \frac{170 \angle 0^\circ}{.377 \angle 90} = 451 \text{ A } \angle -90$$



$$Z_c = \frac{1}{j \cdot 2\pi \cdot 60 \cdot 5 \cdot 10^{-6}} = -j(531)$$

$$V_{\text{OLT}} = 169 \angle 0^\circ \cdot \frac{100}{100 - j531}$$

$$|I| = \sqrt{100^2 + (531)^2}$$

$$\angle = \tan^{-1} \frac{-531}{100}$$

$$V_{\text{OLT}} = \frac{16,900 \angle 0^\circ}{540 \angle -79^\circ}$$

$$= 31.3 \angle 79^\circ$$

11)

$$v_{out} = 31.3 \angle 79^\circ$$

$$= 31.3 \cdot \sin(2\pi \cdot 60 + 79^\circ)$$

$$79^\circ = \frac{\Delta t}{16.67} \cdot 360$$

$$\Delta t = 3.66 \text{ ms}$$

