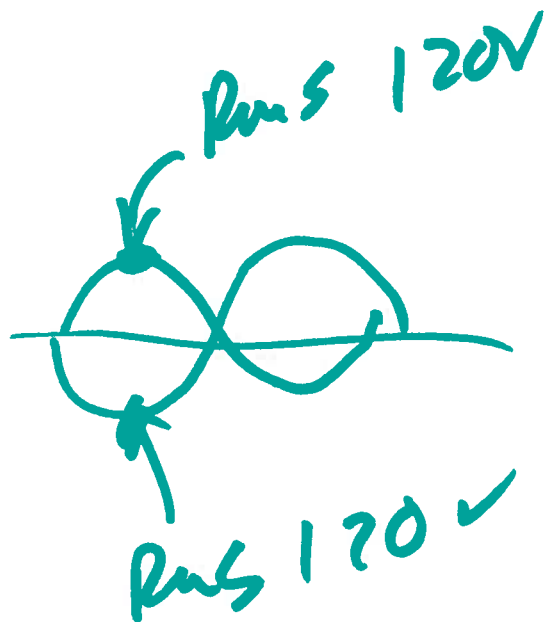


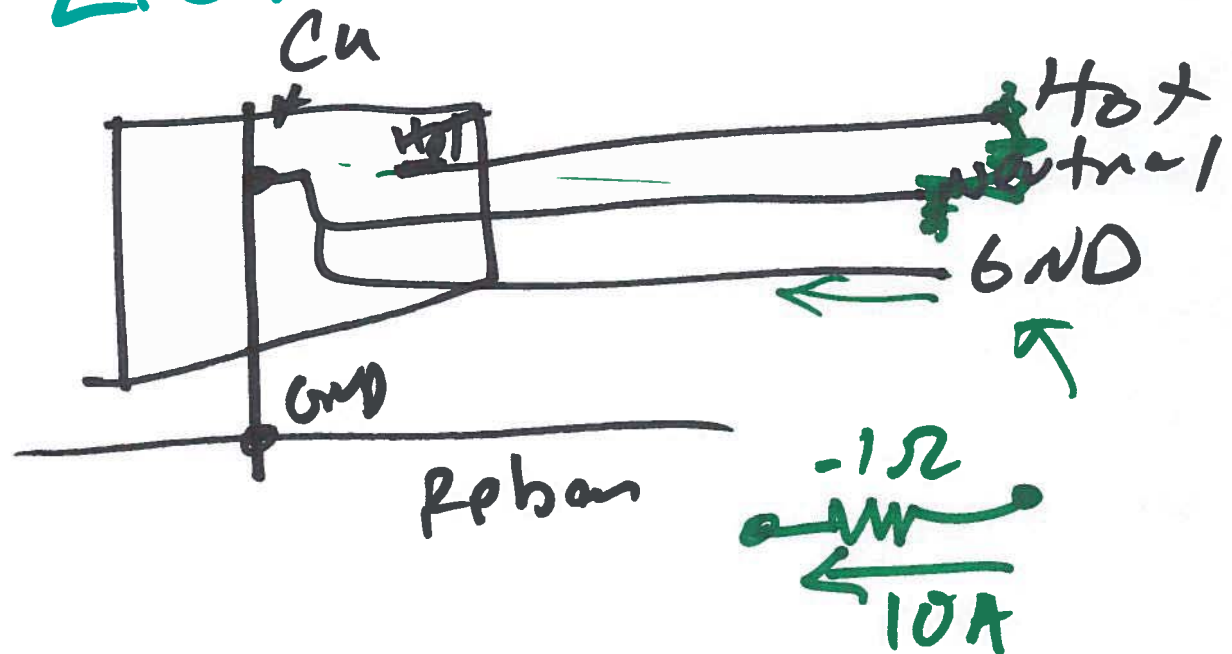
EE 220

Circuits 1
Spring 2017

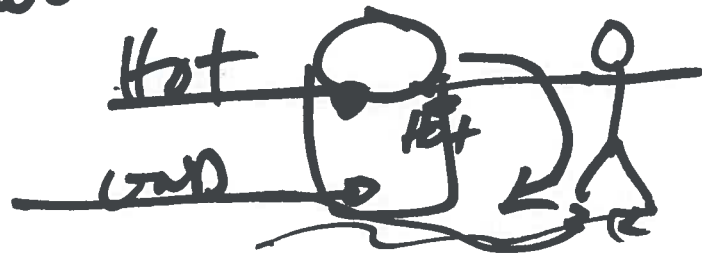
Lecture 22



• •
✓ ✓
240V



two wire

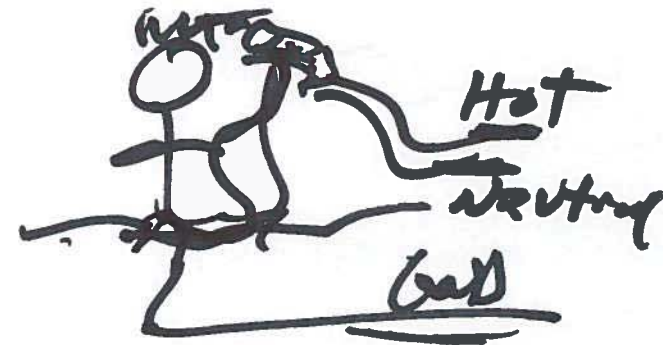


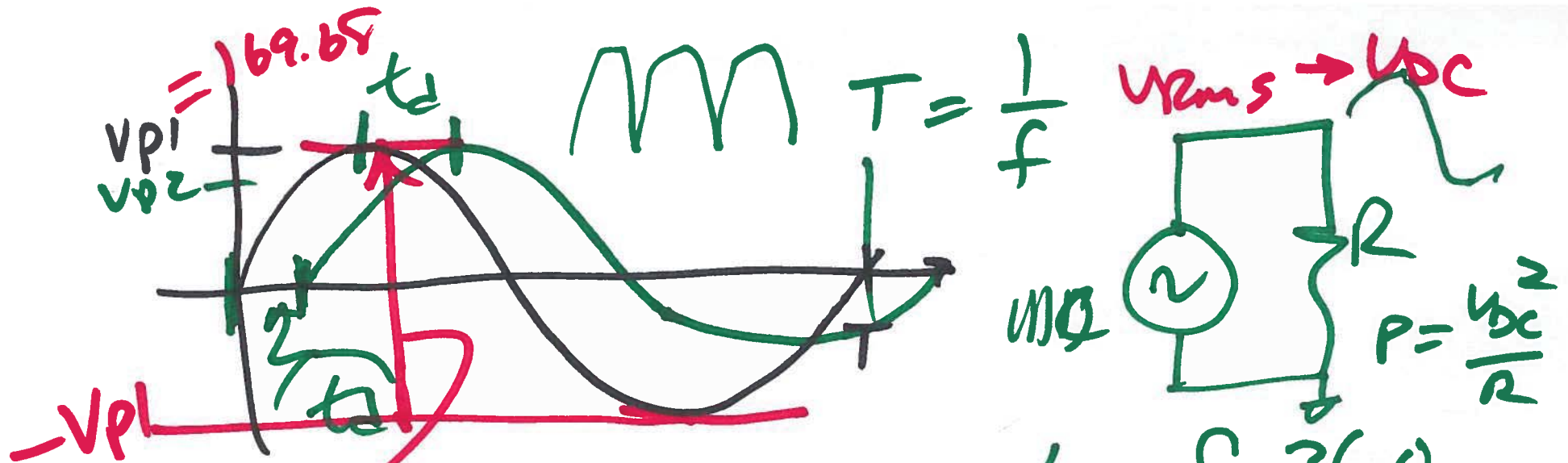
bkd
(old)



Chassis is

$$P = \frac{V^2}{R}$$





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

$$\theta = t_d \cdot 360 = t_d \cdot f \cdot 360$$

$$V_{pp} = 340V$$

RMS = Root of the mean of the square

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

$$\sin^2 x = \frac{1 - \cos 2x}{2}$$

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

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

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

$$\int_0^T \cos \frac{2\pi \cdot t}{T/2} \cdot dt$$

$V_p \approx 120 \text{ V}_{rms}$ $V_p = 169.68$ $V_{rms} = 120$



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4)

Impedance = z

$$i \downarrow \frac{+}{-} v = i \cdot \frac{1}{j \cdot \omega C} = i \cdot \frac{1}{j \cdot 2\pi f \cdot C}$$

$j = \sqrt{-1}$

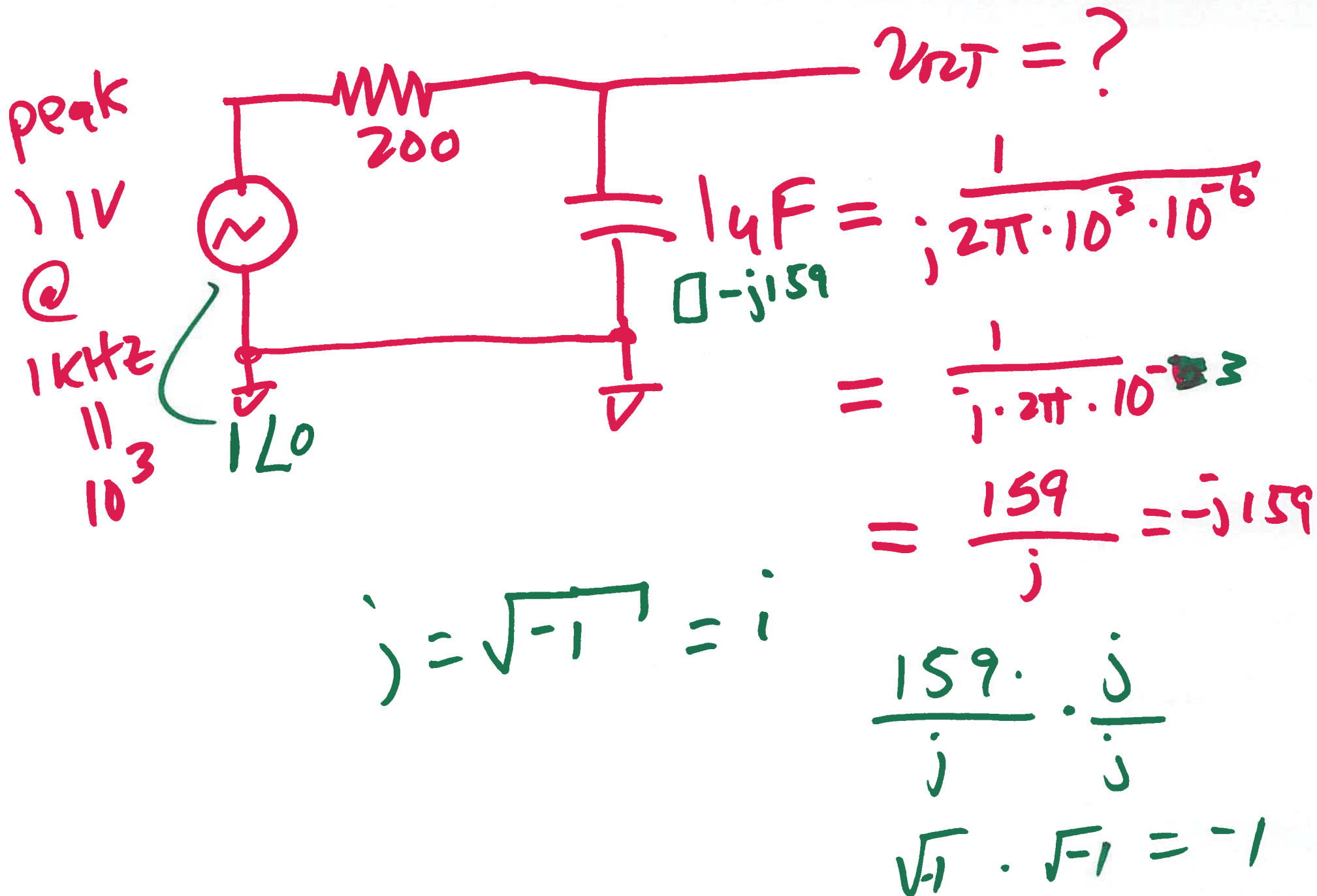
$$i \downarrow \frac{+}{-} v = i \cdot j \omega L = i \cdot j \cdot 2\pi f \cdot L$$

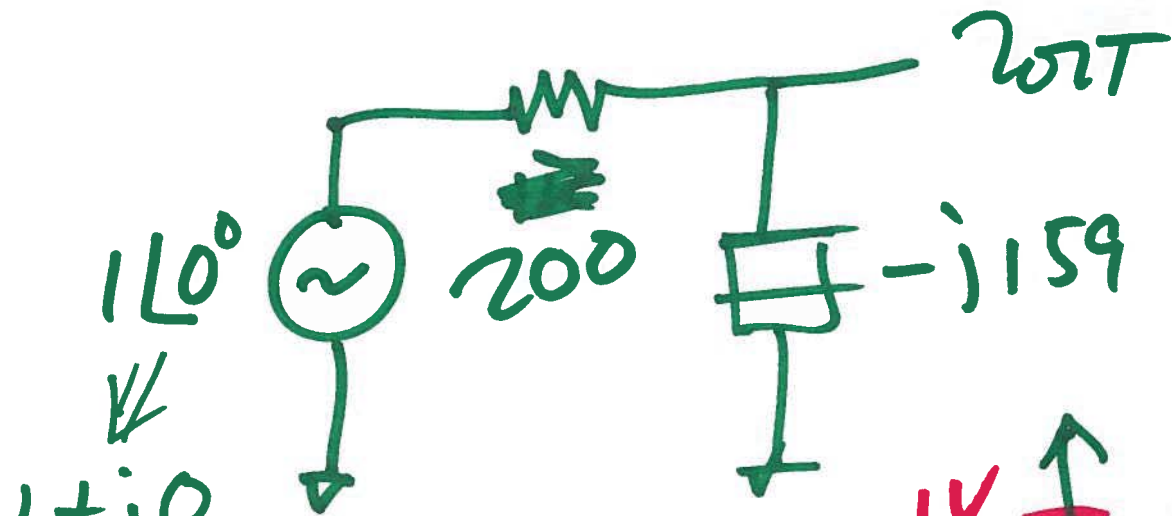
$$z = 1k\Omega + \frac{1}{j \cdot \omega \cdot 10^{-6}}$$



@ 60 Hz

$$z = 1,000\Omega + \frac{1}{j \cdot 2\pi \cdot 60 \cdot 10^{-6}}$$





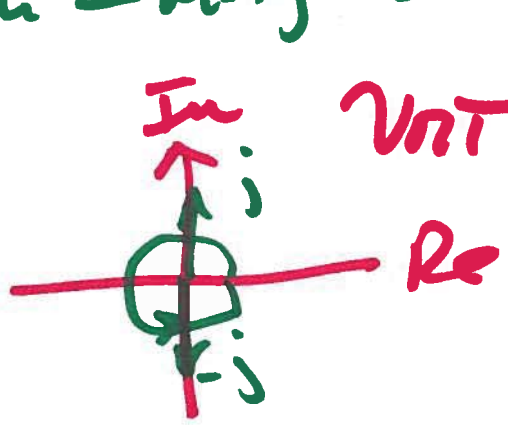
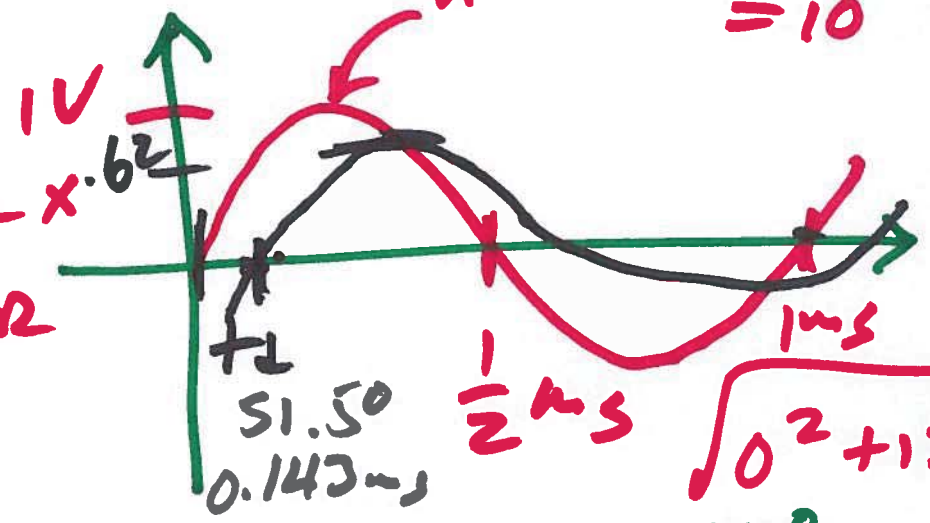
$$10^3 = 1\text{kHz} = \frac{1}{T}$$

$$T = 1\text{ms} = 10^{-3}\text{s}$$

$1 + j0$
 $\text{Re} = \text{Mag} \cdot \cos \theta$
 $\text{Im} = \text{Mag} \cdot \sin \theta$

ADD → Rect.

÷ OR × polar



$$V_{\text{RT}} = 1\angle 0^\circ \cdot \frac{-j159}{-j159 + 200}$$

$$\frac{159 \angle -90^\circ}{255 \angle 38.1^\circ} = 159 \angle -128.1^\circ$$

$$\theta = \tan^{-1} \frac{-159}{0} = -\tan^{-1} \infty$$

7)

$$|I| = \sqrt{159^2 + 200^2} = 255.5$$

$$\angle = \tan^{-1} \frac{-159}{200} = -\tan^{-1} \frac{159}{200} = -38.5^\circ$$

$$\theta = \frac{t_d}{T} \cdot 360$$

$$-51.5 = \frac{t_d}{1\text{ms}} \cdot 360 \quad \angle_{VT} = \frac{159 \angle 270^\circ}{255 \angle -38.5^\circ}$$

$$t_d = -\frac{51.5}{360} \cdot 1\text{ms} \quad \angle_{VT} = 0.62 \angle 270 - (-38.5^\circ)$$

$$= 0.143\text{ms} \quad \angle_{VT} = 0.62 \angle 308.5^\circ$$

$$0.62 \angle -51.5^\circ$$

8)