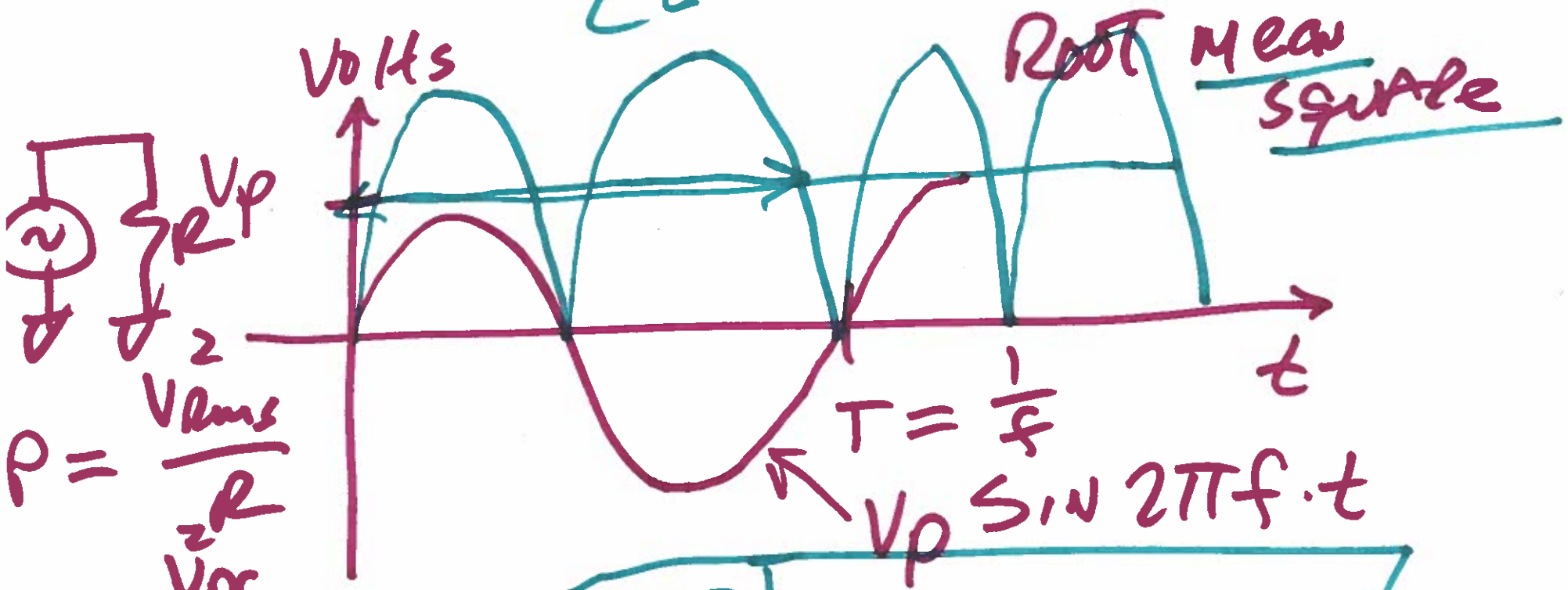
EE 220 circuits 1

November 20, 2019

Lecture 23



$$P = \frac{V_{rms}}{R}$$

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

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

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

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

$-j = \frac{1}{j}\cdot\frac{j}{j} \rightarrow -1$

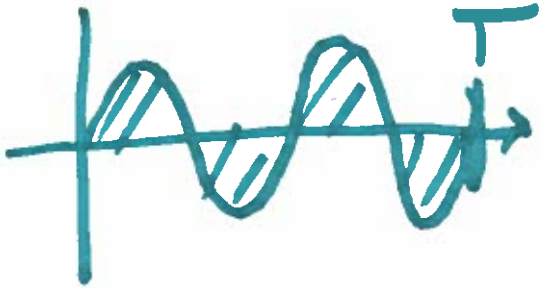
$$\sqrt{-1}\cdot\sqrt{-1} = \sqrt{\frac{V_P^2}{2T}\int_0^T dt - \int_0^T \cos 4\pi f t\,dt}$$

$\int_0^T \cos 4\pi f t\,dt \rightarrow 0$

$j\cdot 1 = -j$

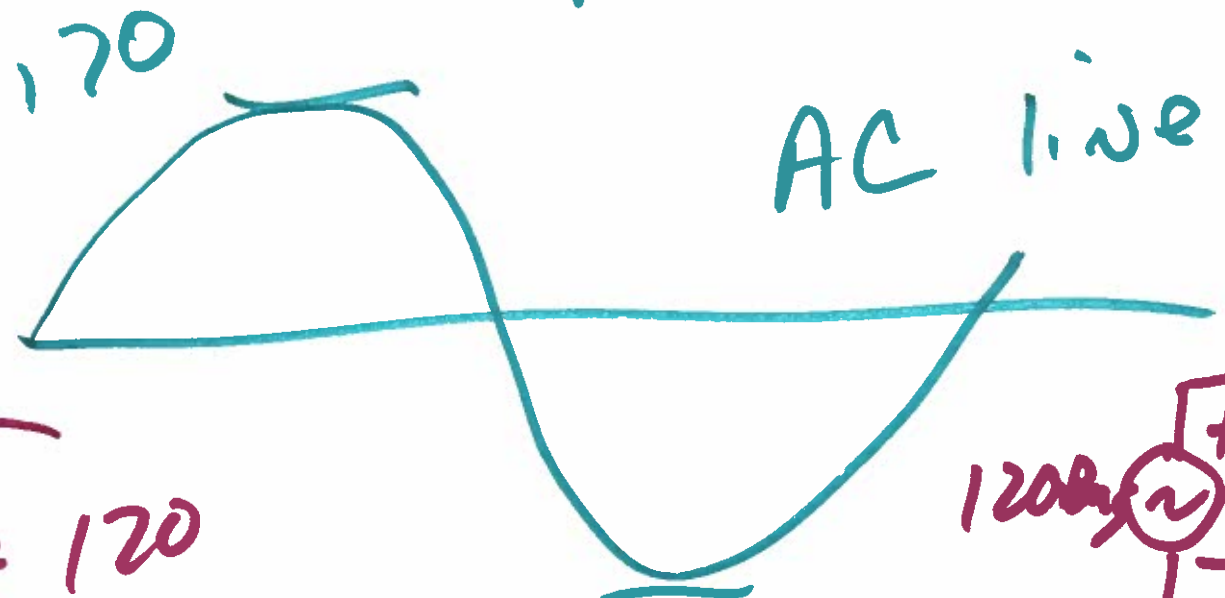
$\frac{-j}{-1}$

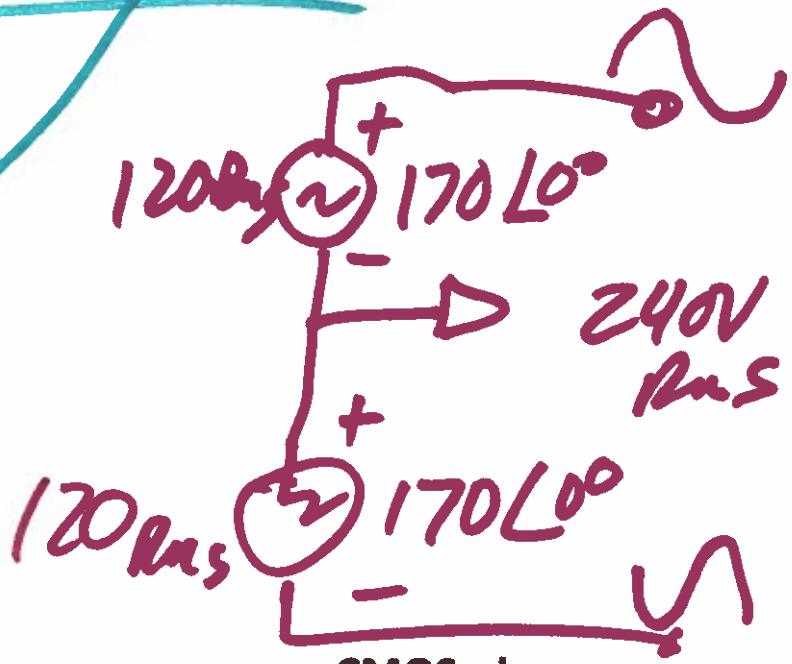
$$\boxed{V_{RMS} = \frac{V_P}{\sqrt{2}}}$$

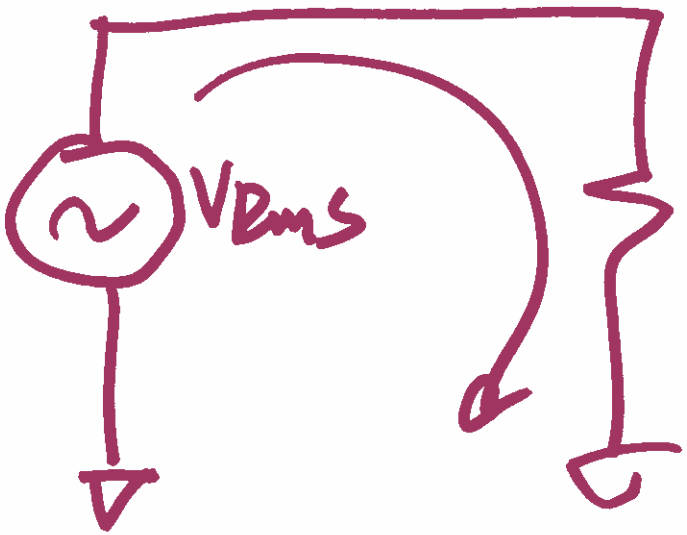


120V Rms $V_{Rms} = \frac{V_p}{\sqrt{2}}$

$V_p = 120 \cdot \sqrt{2} = 169.2 \simeq 170V$







$$R \rightarrow P = \frac{V_{Rms}^2}{R}$$

$$I_{rms} = \frac{V_{rms}}{R} = 1mA$$

$$i(t) = 1mA \cdot \sqrt{2} \cdot \cos(2\pi f \cdot t)$$

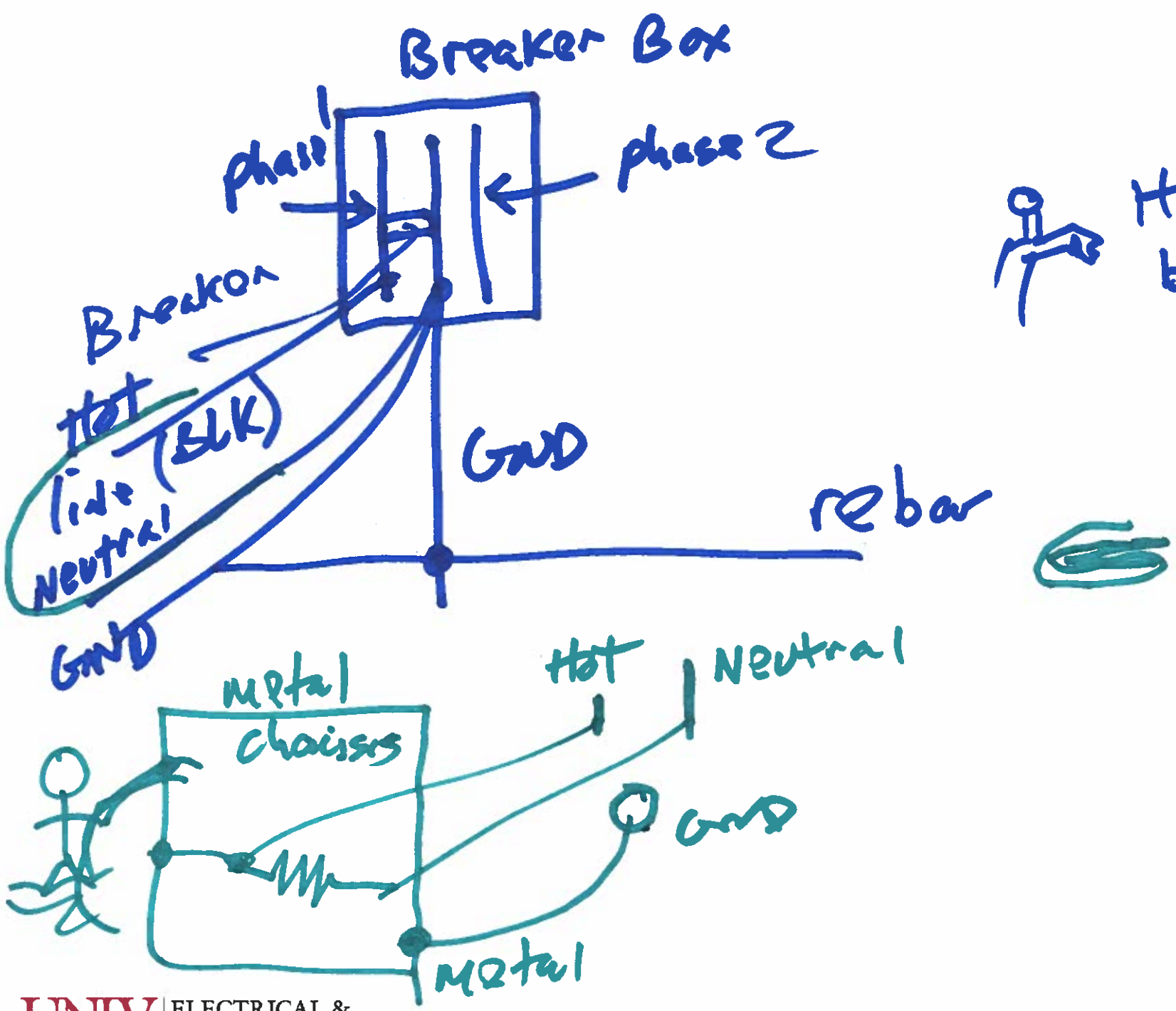
$$V_{rms} \overset{\lim_{T\to\infty}}{=} \sqrt{\frac{1}{T}\int_0^T V_{DC}^2 \cdot dt}$$

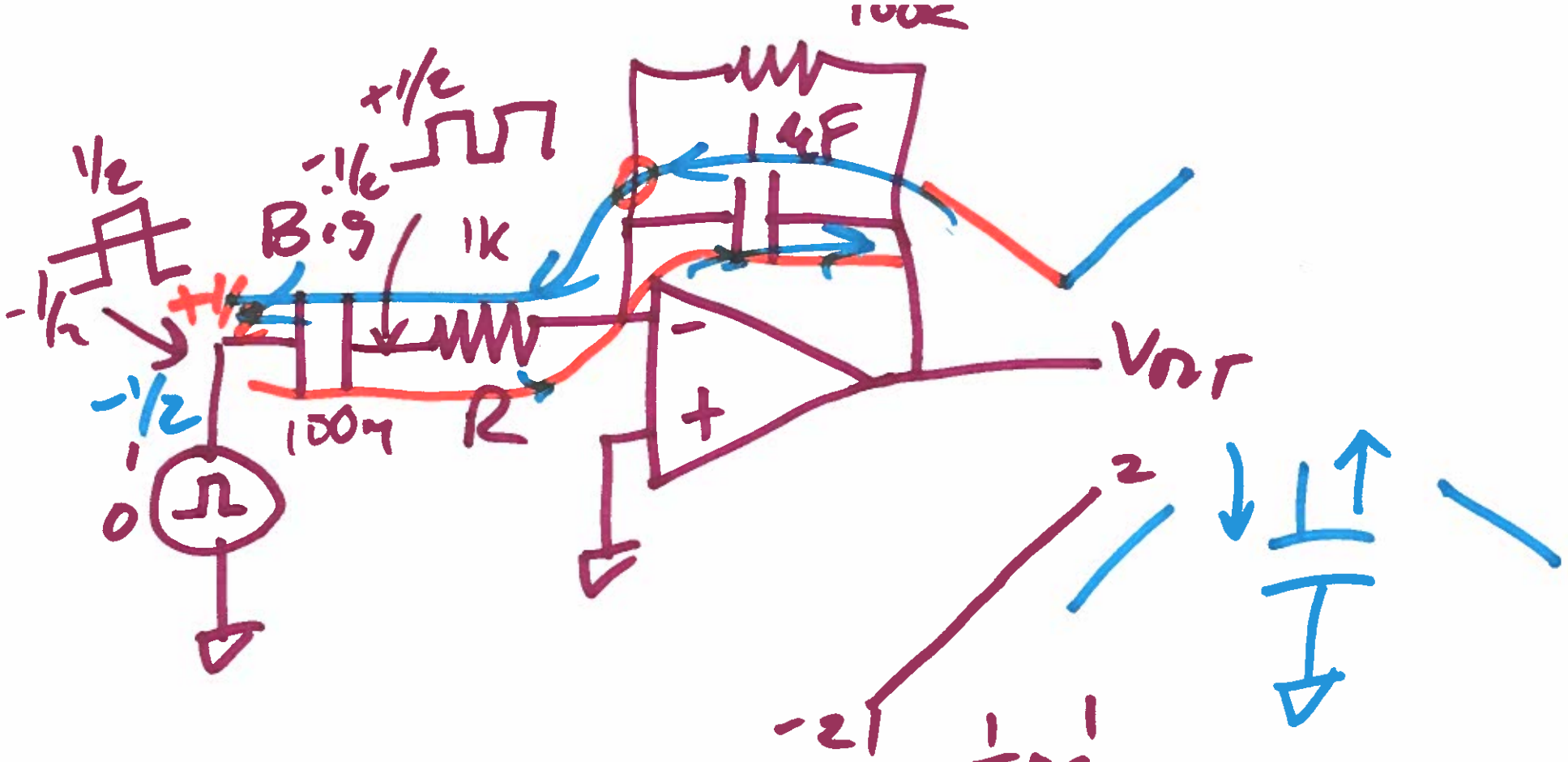
$$= \sqrt{\frac{1}{T} V_{DC}^2 \, T \Big|_0^T}$$

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

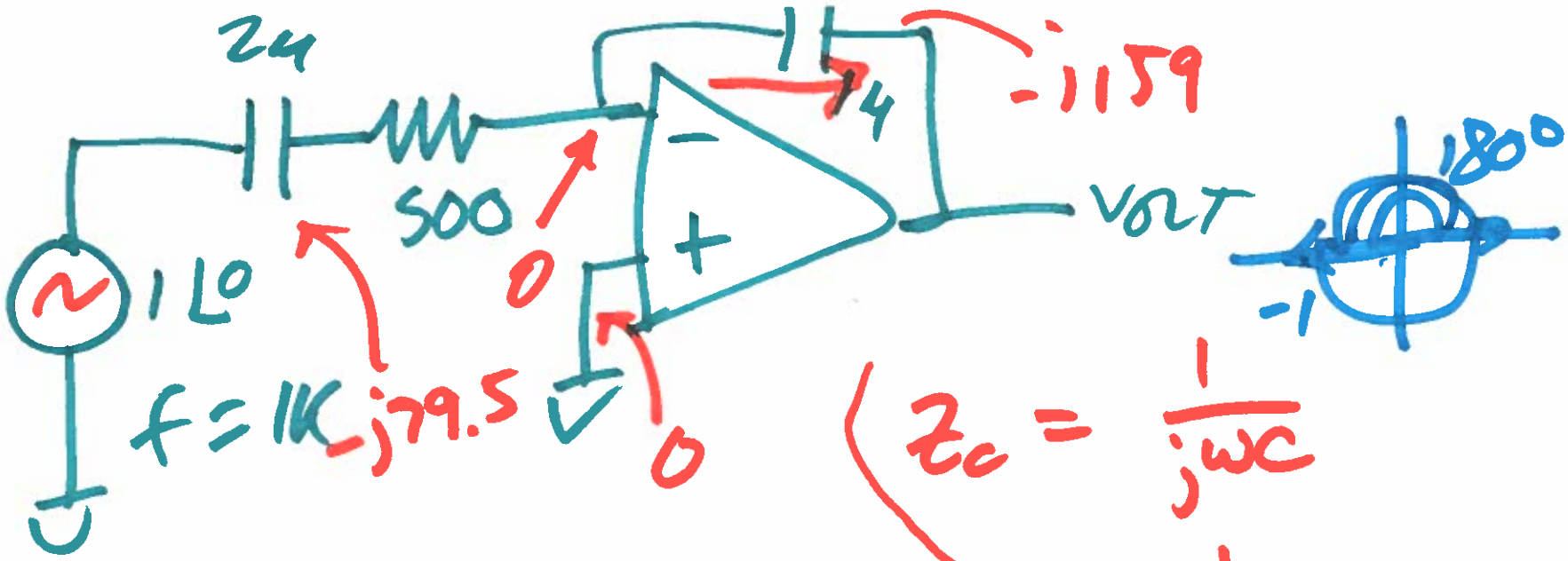
$$v(t) \cdot i(t)$$

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

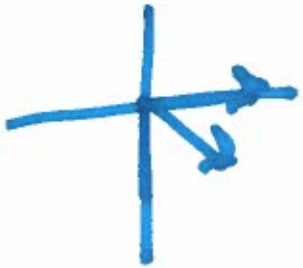

Breaker Box
phase 1
phase 2
Breaker
Hot
Line (BLK)
Neutral
GND
rebar
Hose bibb
GND
Metal Chassis
Hot
Neutral
GND
Metal



$$I = C\frac{dV}{dT} = \frac{1/2V}{R} = \frac{1}{\frac{1}{2}mS} \cdot 1/4F \cdot \frac{4}{1/2mS}$$



$$Z_C = \frac{1}{j\omega C}$$



$$\frac{1\angle 0}{500 + j(-79.5)} = \frac{0 - V_{OUT}}{j(-159)} = \frac{1}{j \cdot 2\pi \cdot 10^3 \cdot 10^{-6}}$$

$$= -j159$$

$$\frac{1\angle 0}{506.3\angle -90^\circ} = \frac{V_{OUT}\angle 180^\circ}{159\angle 270^\circ}$$

$-1 \Rightarrow 1\angle -180^\circ$

$$D\angle\theta_4 \cdot \frac{A\angle\theta_1}{B\angle\theta_2} = \frac{C\angle\theta_3}{D\angle\theta_4} \cdot D\angle\theta_4$$

$$= \cancel{\phi} \frac{C}{\cancel{\phi}} \angle\theta_3 + \cancel{\theta_4} - \cancel{\theta_4}$$

$$= C\angle\theta_3$$

$$\frac{1.159}{506}$$

$$V_{OUT} = \frac{1\angle 0 \cdot 1\,\mathrm{J}9\angle 270^\circ}{506.3\angle -9 \cdot 1\angle 180^\circ} = \angle 270 - (-9) - 180$$

$$V_{OUT} = 0.314\angle 99^\circ$$

$$v_{IN} = 1 \cdot \sin(2\pi \cdot 10^3 \cdot t)$$

$$v_{OUT} = 314\,mV \cdot \sin(2\pi \cdot 10^3 \cdot t \pm 99)$$

$t_d = 275\,\mu s$

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

$$\frac{99}{360} \cdot 1\,ms = t_d$$

$$t_d = 275\,\mu s$$