$360 = 2\pi$

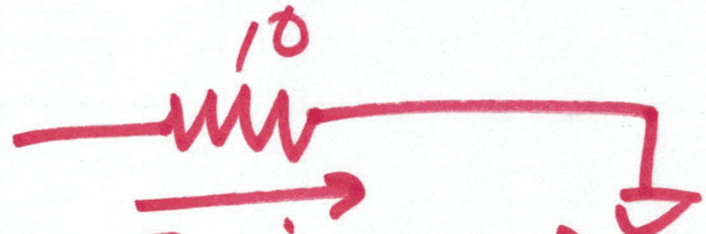
$120 = \frac{2}{3}\pi$

$240 = \frac{4}{3}\pi$

EE 22[illegible]1 Ciriuits II

Lecture 9

Feb. 15, 2023



$v_1(t) = V_p \sin(2\pi f \cdot t)$

$i_1(t) = I_p \sin(2\pi f \cdot t) = \frac{V_p}{10} \sin(\ )$

$v_2(t) = V_p \sin(2\pi f t + 120)$

$p_1(t) = v_1(t) \cdot i_1(t)$

$+ p_2(t) = v_2(t) \cdot i_2(t)$

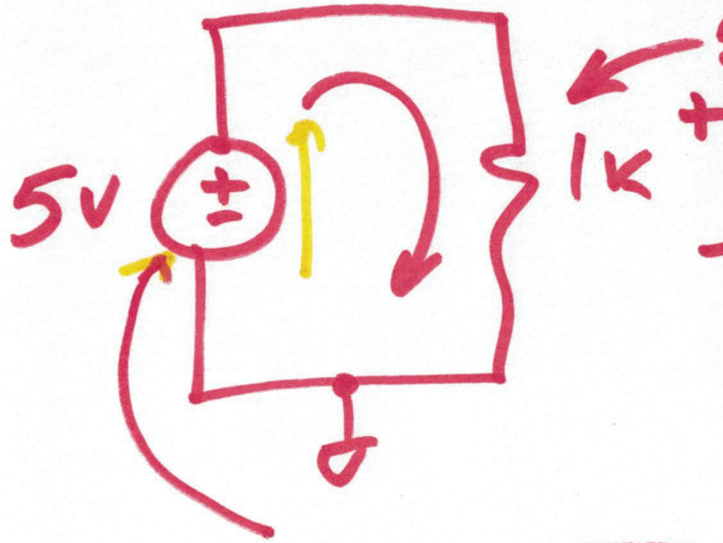
$+ p_3(t) = v_3(t) \cdot i_3(t)$

$$e^{jx} = \cos x + j \sin x$$

Euler's formula

$$\cos x = \frac{e^{jx} + e^{-jx}}{2}$$

$$\sin x = \frac{e^{jx} - e^{-jx}}{2j}$$



$VI = 5 \cdot 5\,mA = 25\,mW$

$\frac{V^2}{R} = \frac{5^2}{1K} = 25\,mW$

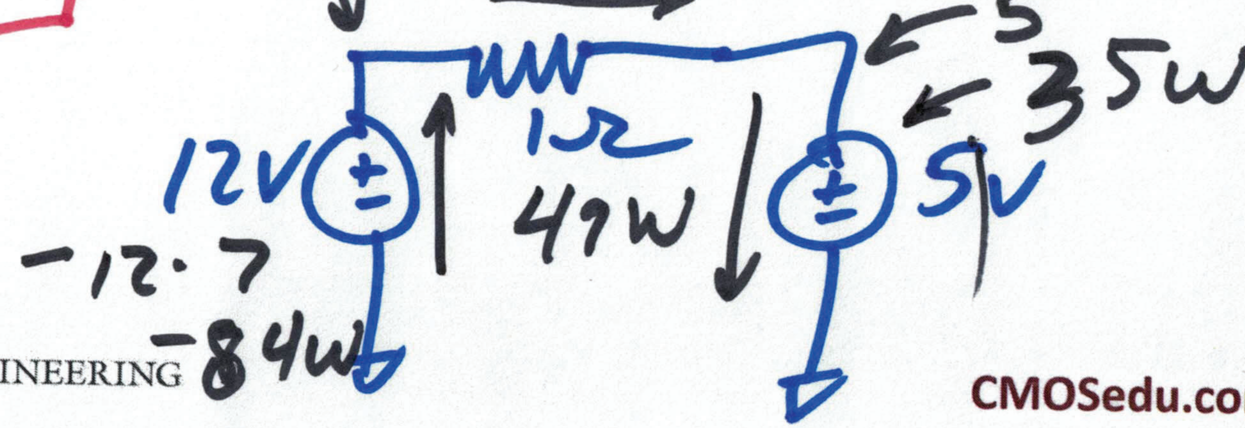
$I^2R = (5\,mA)^2 \cdot 1K = 25\,mW$

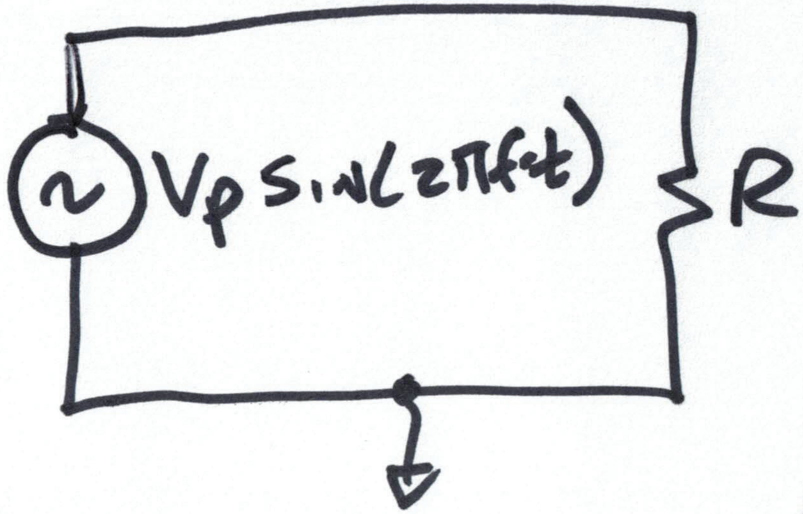
$\underbrace{5 \cdot \sqrt{2}}_{V_P}\ \sin(2\pi f \cdot t)$

7A

12

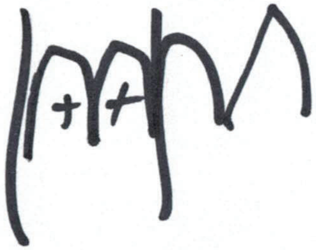
$7.07\ \sin(2\pi f \cdot t)$





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

instanteous power



mean

square

root

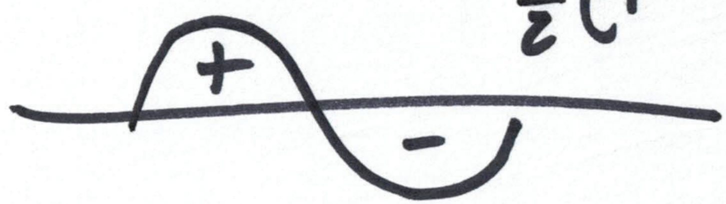
$$V_{rms} = \sqrt{\frac{1}{T}\int_0^T V_p^2 \sin^2(2\pi f\cdot t)\cdot dt}$$

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

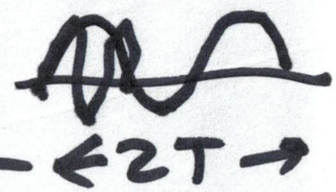
$$\sqrt{\frac{V_p^2}{T}\int_0^T \frac{1-\cos 4\pi f\cdot t}{2}\cdot dt}$$

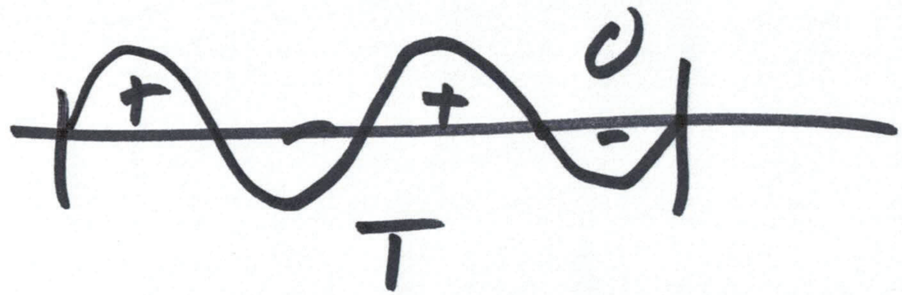
$$\sqrt{\frac{V_p^2}{T}\left[\int_0^T \frac{1}{2}\cdot dt - \cancelto{0}{\int_0^T \frac{\cos 4\pi f t}{2}\cdot dt}\right]}$$

$\frac{1}{2}(T-0)$

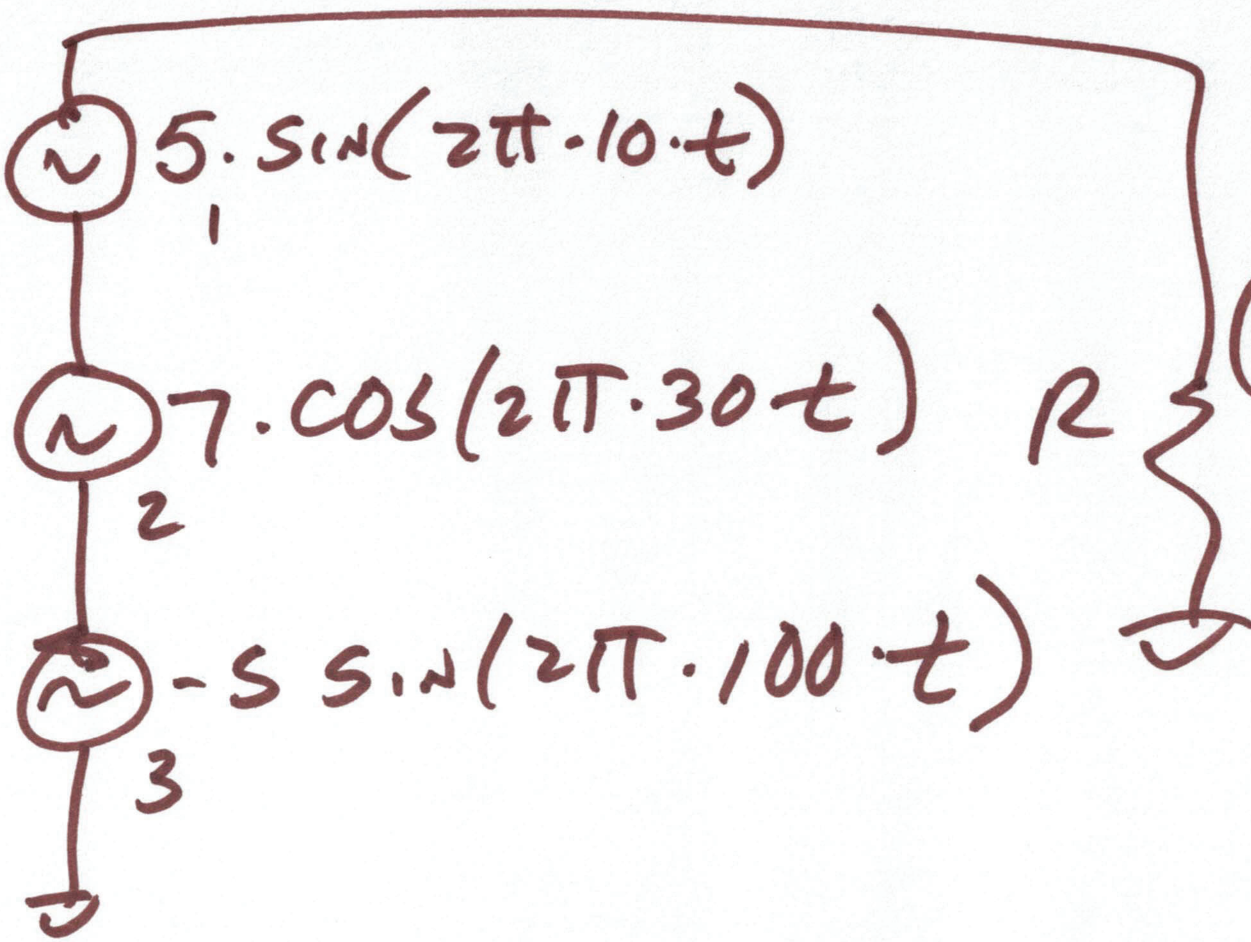


$f=\frac{1}{T}$

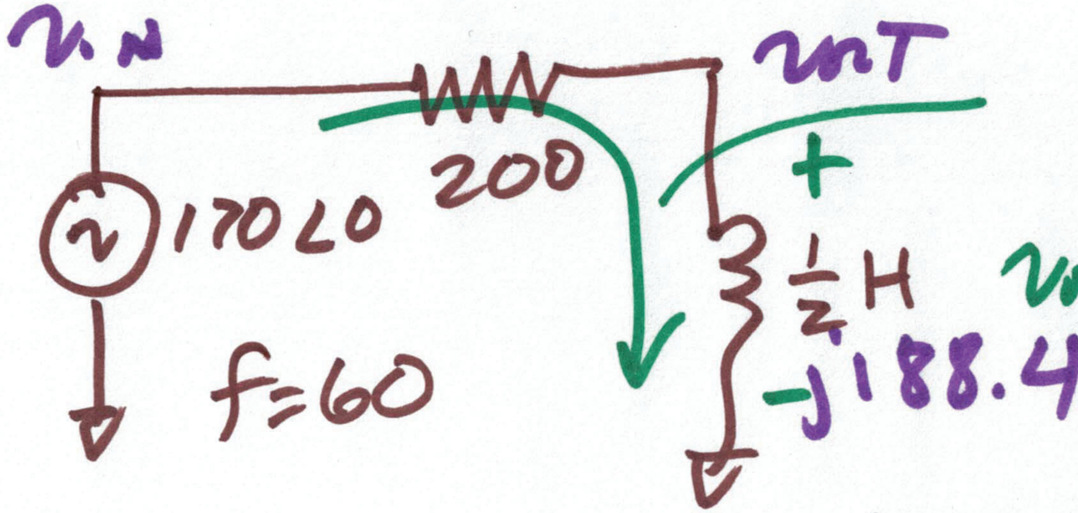




$$\sqrt{\frac{V_p^2}{T}\cdot\frac{T}{2}} = \frac{V_p}{\sqrt{2}} = V_{rms}$$



$$\frac{\left(V_{rms1}^2 + V_{rms2}^2 + V_{rms3}^2\right)}{R}$$



$$\frac{170\angle 0}{200+j188.4}$$

$$v_{out} = (\downarrow)\cdot(j188.4)$$

$$v_{out} = 170\angle 0 \cdot \frac{j188.4}{200+j188.4}$$

$$= \frac{170\angle 0 \cdot 188.4\angle 90}{275\angle 43.3^\circ}$$

$$v_{out} = 116.5\angle 46.7^\circ$$

$$46.7 = 360 \cdot \frac{t_d}{16.67\,ms}$$

$t_d = 2.16\,ms$, $T = 16.67\,ms$

$v_{OUT} = 116.5 \sin(2\pi \cdot 60 \cdot t + 46.7)$