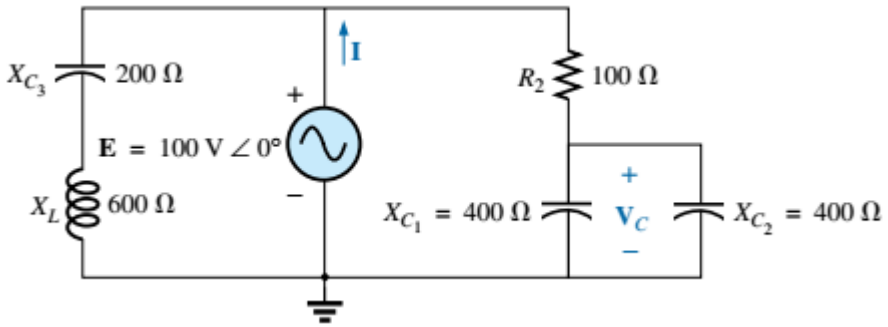
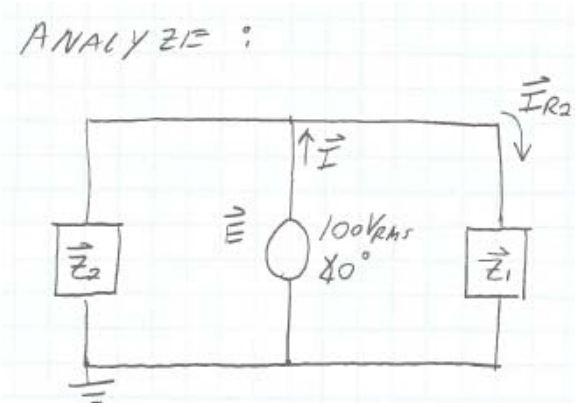
In Class Problem





Find: **I,** P_{R2}

(one possible) Strategy/Plan 1st

1) Combine R_2, C_1, C_2 -> **Z_1**
2) Combine C_3, L -> **Z_2**
3) Analyze the parallel circuit
   - ☐ **I**
   - ☐ P_{R2}

$\vec{Z}_1$

$R_2, C_1, C_2 \Rightarrow 100\Omega + (-j400\Omega) // (-j400\Omega)$

$(100 - j200)\Omega = 223.6\Omega \angle -63.4°$

$\vec{Z}_2$

$C_3, L \Rightarrow -j200 + j600$

$= j400\Omega$ or $400\Omega \angle 90°$

Finding **I:**

$$\vec{I} = \frac{\vec{E}}{\vec{Z}_1 // \vec{Z}_2}$$

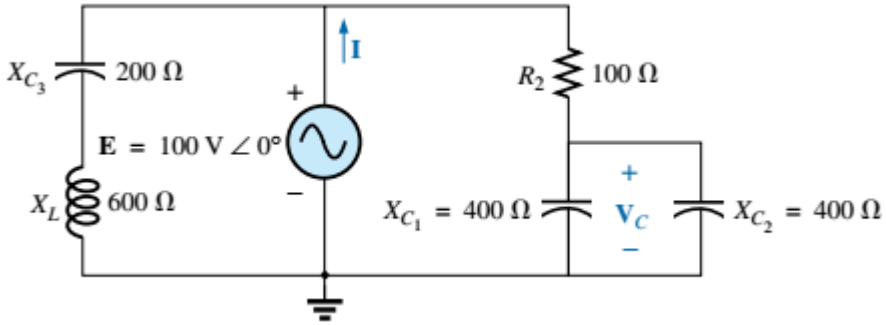
$$\vec{I} = \frac{100\,V_{RMS} \angle 0°}{(223.6\Omega \angle -63.4°) // (400\Omega \angle 90°)}$$

$$\vec{I} = \frac{100\,V_{RMS} \angle 0°}{400\Omega \angle -36.87°}$$

$$\vec{I} = 250\,mA_{RMS} \angle 36.9°$$

NP

In Class Problem



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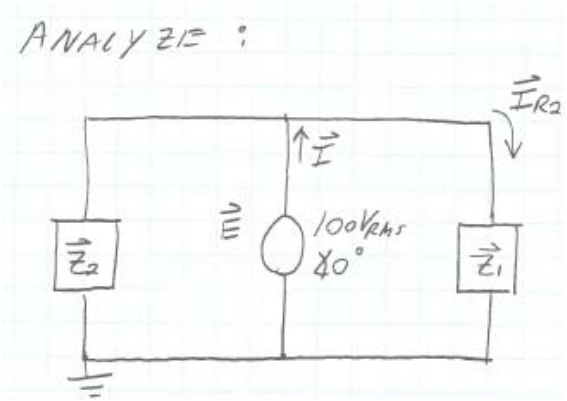

Finding P_{R2}:

$$P_{R2} = \left|\vec{I}_{R2_{RMS}}\right|^2 \cdot R_2$$

$$\vec{I}_{R2} = \vec{I}\left(\frac{\vec{Z}_1 /\!/ \vec{Z}_2}{\vec{Z}_1}\right)$$

$$= 250\,mA_{RMS} \angle 36.9^\circ \left(\frac{400\,\Omega \angle -36.9^\circ}{223.6\,\Omega \angle -63.4^\circ}\right)$$

$$\vec{I}_{R2} = 447.2\,mA_{RMS} \angle 63.4^\circ$$

$$\therefore P_{R2} = (447.2\,mA_{RMS})^2 \cdot 100\,\Omega = \boxed{20\,W}$$

An easy way to check this result?

CHECK: $P_{AVE} = |\vec{V}_{RMS}| \cdot |\vec{I}_{RMS}| \cdot \cos(\theta)$

$= (100\,V_{RMS})(250\,mA_{RMS})\underbrace{\cos(0^\circ - 36.9^\circ)}_{0.8}$

$\boxed{P_{AVE} = 20\,W}$ ✓

NP