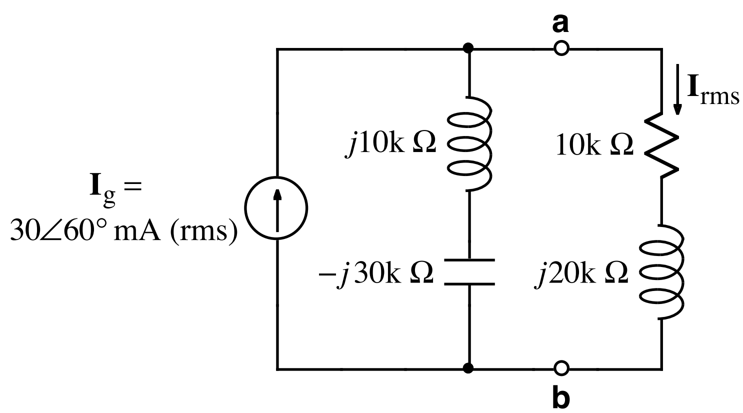
HOMEWORK #8 prob 1 solution

Ex:



a) Calculate the value of rms voltage, $\mathbf{I}_{\text{rms}}$, flowing in the circuit to the right of terminals **a** and **b**.

b) Calculate the complex power, S, for the circuit to the right of terminals **a** and **b**. Include appropriate units for S.

SOL'N: a) We use the current divider formula to find $\mathbf{I}_{\text{rms}}$:

$$\mathbf{I}_{\text{rms}} = \mathbf{I}_g \frac{j10\text{k} - j30\text{k}\,\Omega}{j10\text{k} - j30\text{k} + 10\text{k} + j20\text{k}\ \Omega} = 30\angle 60°\,\text{mA(rms)}\frac{-j20\text{k}}{10\text{k}}$$

or

$$\mathbf{I}_{\text{rms}} = 30\angle 60°\,\text{mA(rms)}(-j2) = 30\angle 60° \cdot 2\angle -90°\,\text{mA(rms)}$$

or

$$\mathbf{I}_{\text{rms}} = 60\angle -30°\,\text{mA(rms)}$$

b) We can use the following convenient formula for S:

$$S = |\mathbf{I}_{\text{rms}}|^2 z = [60\,\text{mA(rms)}]^2 (10\text{k} + j20\text{k}\,\Omega)$$

or

$$S = 3.6\text{k}\,\text{mm} \cdot (10\text{k} + j20\text{k}\,\Omega) = 36 + j72\ \text{VA}$$