AC Circuits Example Problems

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1. What is the resistance of a light bulb that uses an average power of 75.0 W when connected to a 60 Hz power source with a peak voltage of 170 V?

2. When a 4.0 μF capacitor is connected to a generator whose output is 30 V, the current in the circuit is observed to be 0.3 A. What is the frequency of the source?

3. An inductor has a 54.0 Ω reactance at 60.0 Hz what will be the maximum current if this inductor is connected to a 50.0 Hz source that produces a 100 V rms
4. A 50.0 $\Omega$ resistor, a 0.100 H inductor, and a 10.0 $\mu$F capacitor are connected in series to a 60.0 Hz source. The rms current in the circuit is 2.75 A. Find the rms voltages across:

(a) the resistor
(b) the inductor
(c) the capacitor
(d) the RLC combination
(e) Sketch the phasor diagram for this circuit.
5. Consider a series RLC circuit with $R = 25 \ \Omega$, $L = 6.0 \ \text{mH}$, and $C = 25 \ \mu\text{F}$. The circuit is connected to a $10 \ \text{V rms}$, $600 \ \text{Hz}$ AC source:

   (a) What is the sum of the voltage drops across $R$, $L$, and $C$?
   
   (b) Which is greatest, the power delivered to the resistor, to the capacitor, or the inductor?
   
   (c) Find the average power delivered to the circuit.