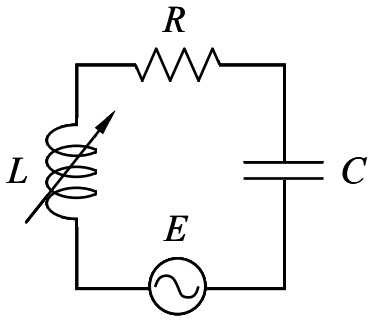
Name: _____ Sec. _____ **P212: Quiz 8A, Week 11**

In the RLC circuit shown at right, the resistance R and capacitive reactance X_C are set to the given values. The inductor is of variable magnitude (indicated by the diagonal arrow). The AC generator puts out a peak EMF of $\mathcal{E}_{max}$ = 120 V.



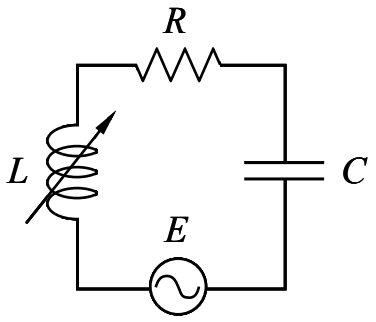
$R = 200\ \Omega$
$X_C = 400\ \Omega$
$E_{max} = 120$ V

1) If the inductance is set to L = 300 μH, the circuit is <u>in resonance</u>. Given this information, calculate the capacitance C of the circuit and the frequency ω of the generator. **[5]**

2) Leaving the frequency ω and peak voltage $\mathcal{E}_{max}$ of the AC generator unchanged, the variable inductor is now changed to L = 200 μH. This puts the circuit off resonance. What is the phase angle ϕ of the generator EMF with respect to the current? **[4]**

3) Does the generator EMF <u>lead</u> or <u>lag</u> the current when L = 200 μH? Provide a brief but clear reason for your answer. **[3]**

4) What is the impedance Z of the final circuit (with $L = 200\ \mu H$)? **[4]**



$R = 200\ \Omega$
$X_C = 400\ \Omega$
$E_{max} = 120\ V$

5) Draw the voltage phasor diagram ($\mathcal{E}$, V_C, V_L, V_R) for this final circuit, with the angles and lengths of the phasors indicated numerically. **[4]**