Name _____

Lab _____

Quiz #9: EM Oscillations and Alternating Current

Problem 1 (1 point)
An RLC series circuit is driven by a sinusoidal emf with angular frequency ω_d. If ω_d is increased without changing the amplitude of the emf, the current amplitude increases. This means that:

a) $\omega_d L > R$
b) $\omega_d L < R$
c) $\omega_d L > 1/\omega_d C$
d) $\omega_d L < 1/\omega_d C$
e) $\omega_d L = 1/\omega_d C$

Problem 2 (2 points)
The figure below shows the current i and driving emf ε for a series RLC circuit driven at frequency f_d. What effect (increase, decrease, or no change) would each of the following changes have on **(a)** the current amplitude I and **(b)** the phase angle φ?
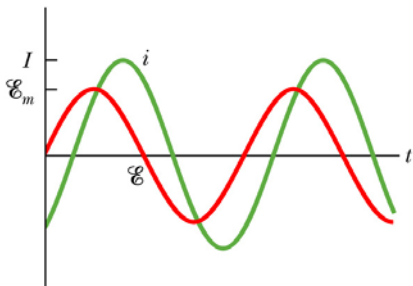
	Effect on I	**Effect on φ**
Increase L		
Increase R		
Increase C		
Increase f_d		

Problem 3 (2 points)
The current amplitude I versus driving frequency ω_d for a series RLC circuit is given in the figure below (**Note**: the driving angular frequency is given in units of **1000** rad/s). The inductance is 175 uH and the emf amplitude is $\varepsilon_m = 125$ V. What are the values of (a) C and (b) R?
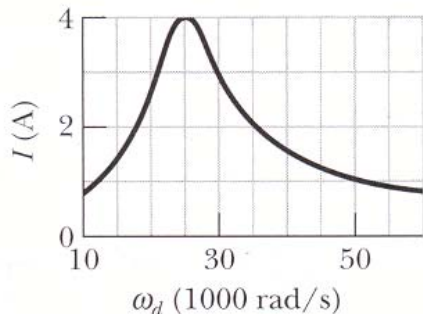
Problem 4 (2 points)
In an oscillating LC circuit, L = 30.0 mH and C = 7.50 μF. At time t = 1.50 s, the current is 9.0 mA and the charge on the capacitor is 3.50 μC. **(a)** What is the maximum charge on the capacitor? **(b)** What is the maximum current?

Problem 5 (3 points)
In the figure below, let $R = 100.0\,\Omega$, $C = 25.0\,\mu F$, L = 200.0 mH, $f_d = 60.0$ Hz, and $\xi_m = 30.0$ V.

(a) What is the maximum current in the circuit? **(b)** What are the rms voltages across the resistor, capacitor, and the inductor?