

Quiz #6

Phy 1304 Fall 2008

Name: KFY

- 1) An circuit has a 5 ohm resistor, a 6 mF capacitor and a 0.2 mH inductor, as shown. It is connected to an alternating voltage source with amplitude 12 V and frequency 1000 Hz. What is the impedance of the circuit? Calculate the phase between the circuit's current and voltage. [20 pts]

$$X_L = \omega L = 2\pi f L = (2\pi \cdot 1000) (0.2 \times 10^{-3}) = 1.26 \Omega$$

$$X_C = \frac{1}{\omega C} = \frac{1}{2\pi f C} = \frac{1}{(2\pi \cdot 1000) \cdot (6 \times 10^{-3})} = 0.027 \Omega$$

$$Z = \sqrt{R^2 + (X_L - X_C)^2} = \sqrt{5^2 + (1.26 - 0.027)^2}$$

$$Z = 5.15 \Omega$$

$$\phi = \tan^{-1} \left(\frac{X_L - X_C}{R} \right) = \tan^{-1} \left(\frac{1.26 - 0.027}{5} \right) =$$

$$\phi = 13.8^\circ$$