PHY 102 Quiz #4 **Name** _____

Score _____

Instructions:
1. Do all of your work on this sheet.
2. **Show all of your steps** in problems for full credit.
3. **Be clear and neat** in your work. Any illegible work, or scribbling in the margins, will not be graded.
4. Place your **answers in a box**.
5. If you need more space, you may use the back of the page and write **On back** in the problem space.

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1. **Multiple Guess (3 pts)** Find the answer which best fits the question and write it in the space provided.

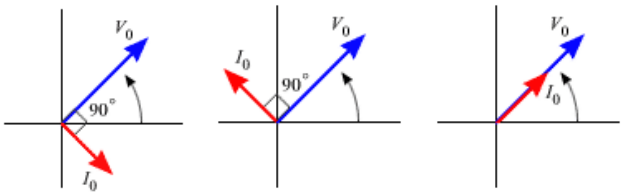
a. In an RC circuit the voltage _____ the current.
a) lags; b) leads. c) is in phase with; _____

b. The impedance has units of
a) farads; b) ohms; c) hertz d) henries e) none of these _____

c. According to Faraday's Law, the induced emf is a result of
a) capacitance; b) voltage; c) change in flux;
d) none of these. _____

2. **Definition/Principle (4 pts)**

a. Indicate which phasor diagrams below are for a resistor, a capacitor, and an inductor.



_____ _____ _____

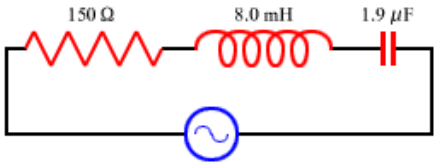
b. Give the exact expression for the self-inductance of a solenoid.

Bonus. What peak voltage is needed to create an rms current of 29.0 A in a circuit containing only a 5.65 μF capacitor, when the frequency of the source is 2.60 kHz?

3. **Problems (13 pts)**

a. On the same bar of iron are wound two coils, one with 40 loops and the other with 18. If a 20.0V alternating voltage is connected to the 40 loop coil, what will be the voltage in the 18 loop coil?

b. What is the resonant frequency of the given circuit?



c. The mutual inductance between two coils is M = 6.0 mH. The current in the primary coil changes at a constant rate from 2.0 A to 5.5 A in 0.020 s. What is the magnitude of the average emf induced in the secondary coil?

d. A series LRC circuit includes a resistance of 160 Ω, an inductive reactance of 357 Ω, and a capacitive reactance of 257 Ω. If the voltage source has an rms voltage of 50.0 V, operating at 1.50 kHz. Determine the following:

i. Impedance

ii. Rms Current

iii. Phase

iv. Does the current lead, or lag, the voltage? _____