

Instructions:

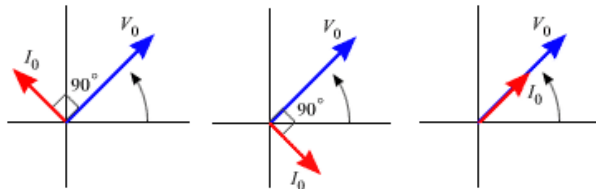
1. Do all of your work on this sheet.
2. **Show all of your steps** in problems for full credit.
3. **Be clear and neat** in your work. Any illegible work, or scribbling in the margins, will not be graded.
4. Place your **answers in a box**.
5. If you need more space, you may use the back of the page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

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

- a. In an RL circuit the voltage \_\_\_\_\_ the current.
  - a) leads;    b) is in phase with;    c) lags.    \_\_\_\_\_
- b. The capacitive reactance has units of
  - a) farads; b) hertz; c) ohms; d) henries e) none of these
- c. In a transformer the number of turns in the secondary coil is less than that in the primary coil. This is
  - a) a step-up transformer; b) a step-down transformer; c) an efficient transformer e) none of these.    \_\_\_\_\_

2. **Definition/Principle (5 pts) - Phasors**

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



\_\_\_\_\_

b. What is Faraday's Law?

c. Give the self inductance of a solenoid in terms of its area, length, and number of turns.

**Bonus:** An LC circuit has a capacitance of  $1.25 \mu\text{F}$  and an inductance of  $2.0 \text{ mH}$ . What is the resonant frequency of this circuit?

3. **Problems (12 pts)**

a. On the same bar of iron are wound two coils, one with 40 loops and the other with 25 loops. If a  $100.0 \text{ V}$  alternating voltage is connected to the 25 loop coil, what will be the voltage in the 40 loop coil?

b. What measured voltage is needed to provide a measured current of  $36.0 \text{ mA}$  in a circuit containing only a  $250.0 \mu\text{F}$  capacitor, when the source frequency is  $25.0 \text{ Hz}$ ?

c. A series LRC circuit includes a resistance of  $15 \Omega$ , a  $5.0 \mu\text{F}$  capacitor, a  $2.0 \text{ mH}$  inductor, and a voltage source with a peak voltage of  $75 \text{ V}$ , operating at  $2.0 \text{ kHz}$ . Determine the following:

i) Impedance

ii) Rms Current

iii) Phase shift

iv) Does the current lead, or lag, the voltage? \_\_\_\_\_