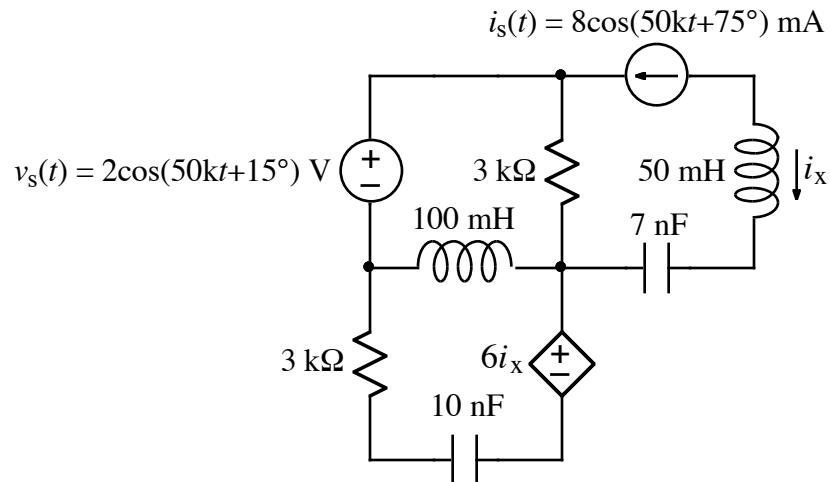ECE 1270
Su 08
HOMEWORK #14
THE
UNIVERSITY
OF UTAH

1. Draw the frequency-domain circuit diagram (with numerical values for impedances and phasors [except the dependent source which will be labeled $6\mathbf{I_x}$]) for the following circuit:


$i_s(t) = 8\cos(50kt+75°)$ mA

$v_s(t) = 2\cos(50kt+15°)$ V

3 kΩ

50 mH i_x

100 mH

7 nF

3 kΩ

$6i_x$

10 nF

2. Given $\omega = 10k$ rad/s, for each of the following impedances, determine which of the following the impedance is from: a capacitor, an inductor, or a resistor. Also, find the value of that capacitor, inductor, or resistor.

    a) 1 kΩ

    b) $-j50$ Ω

    c) $j400$ Ω

    d) $-j2$ kΩ

    e) $j8$ kΩ

3. Derive a symbolic expression for the impedance of an R, an L, and a C in parallel at frequency ω. Rationalize the expression so the denominator is real.
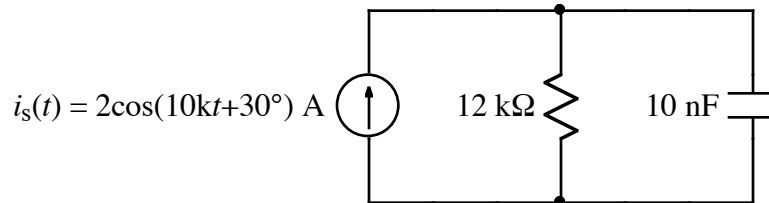
4.   Find the total impedance of the circuitry shown below if $\omega = 1000$ rad/s.

250 mH   4 µF

7 kΩ   100 mH   10 µF

3 kΩ

5.

3 kΩ

$v_S(t) = 4\cos(1\mathrm{M}t)$ V   1 mH
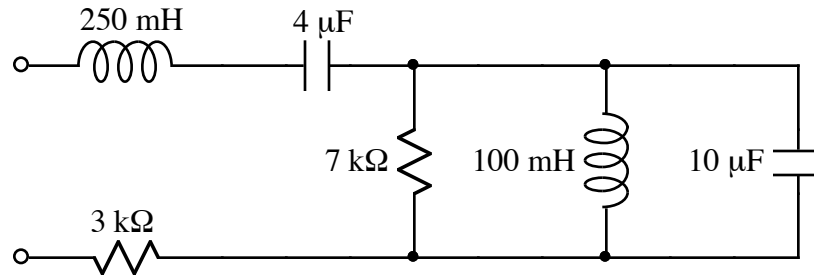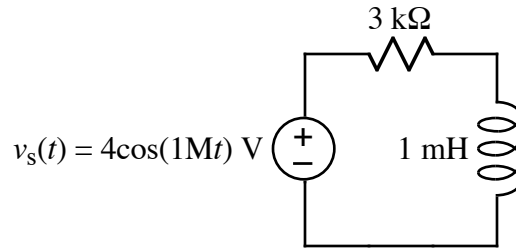
a)   Find time-domain expressions for the waveforms of the voltages across the R and L in the above circuit.

$i_S(t) = 2\cos(10\mathrm{k}t+30°)$ A   12 kΩ   10 nF

b)   Find time-domain expressions for the waveforms of the currents through the R and C in the above circuit.