20.44) If the time constants are the same for the RC and RL circuits shown below, what must R be?

$L = 3\,H$

$C = 3x10^{-6}\,f$

R

R

ε

ε
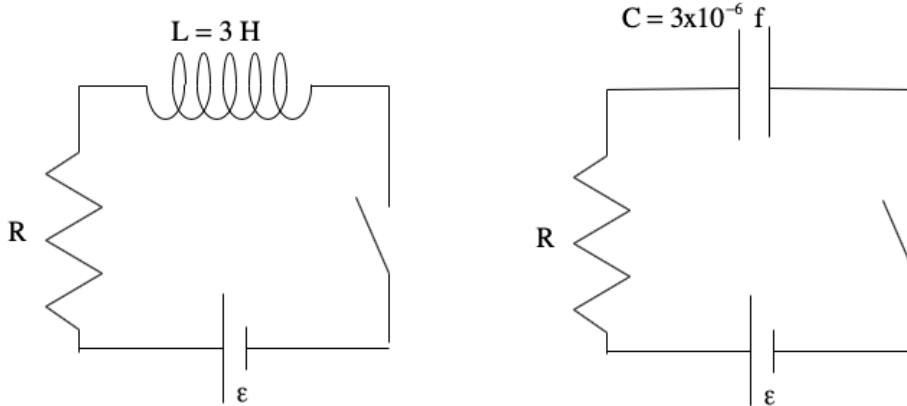
20.45) For the circuit shown to the right, determine:

a.) the battery voltage.

b.) the inductance in the circuits.

c.) the current after one time constant.

d.) the voltage across the resistor after one time constant.

e.) the voltage across the inductor after one time constant.

L

$R=.3\,\Omega$

$\tau_L = .25$ sec

$I_{max} = 8.0$ amps

ε
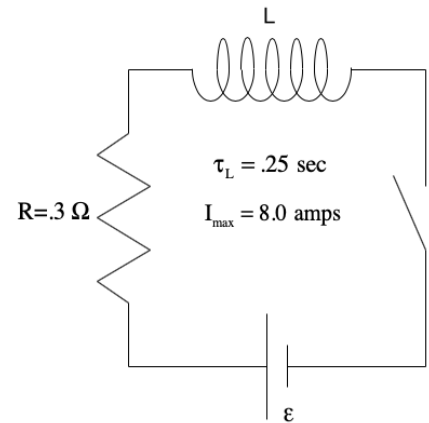
20.48) For the circuit, determine:

a.) what is the time constant?

b.) what is the current in the circuit after two-hundred fifty microseconds ($250x10^{-6}$)?

c.) what is the final steady-state current?

d.) how long does the current take to reach 80% of its maximum value?

$L = 8x10^{-3}\,H$

$R = 4\,\Omega$

$\varepsilon = 6\,V$

R
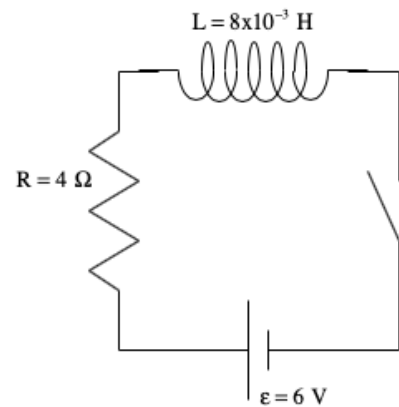
21.1) A lightbulb uses an average power of 75 W.

a.) What is the resistance if used in the circuit to the right?

b.) What is its resistance if the bulb is 100 W?

$\varepsilon = 170\sin(377t)$
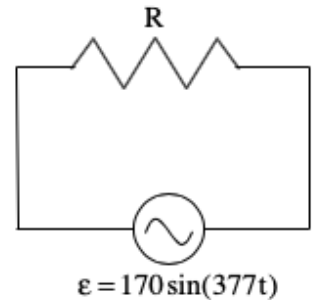
21.2) 60 W bulb operates at 60 Hz when the AC power supply has an RMS rating of 120 volts.

a.) What is the peak (maximum) voltage applied to the bulb?

b.) What is the resistance of the bulb?

c.) Does a 100 W bulb have a greater or lesser resistance than the 60 W bulb?

RC #1) Consider the RC circuit shown to the right.

$C = 40$ nF

a.) What is the RMS value of the power supply?

b.) At what frequency is the power supply acting?

$R = 12\ \Omega$

c.) What is the circuit's capacitive reactance?

d.) What is the circuit's impedance/

$V(t) = 100\sin(3600t)$

e.) What is the circuit's current?

$L = 2.8$ mH,
$r_L \approx 3\ \Omega$
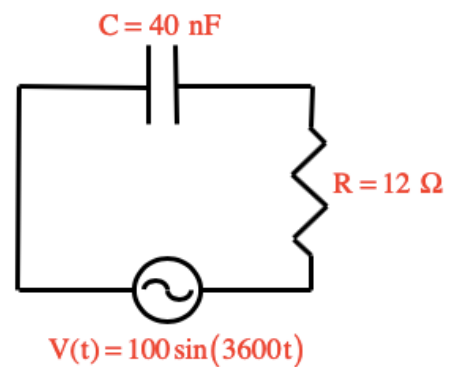
RL #1) Consider the RL circuit shown to the right.

a.) What is the circuit's inductive reactance?

$R = 12\ \Omega$

b.) What is the circuit's impedance?

c.) What is the circuit's current?

$V(t) = 100\sin(3600t)$
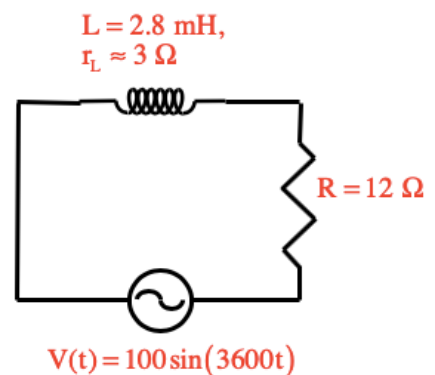
RLC #1) Consider the RLC circuit shown to the right.

    a.) What is the circuit's impedance?

    b.) What is the circuit's current?

    c.) What is the circuit's resonance frequency?

$C = 40 \text{ NF}$

$R = 12 \, \Omega$

$L = 2.8 \text{ mH,}$
$r_L \approx 3 \, \Omega$

$V(t) = 100 \sin(3600t)$