EECS/CSE 70A Network Analysis I

Homework #5

Due on or before
5/22/2018, Tuesday at 5:00PM

(You can submit homework in either of the discussion sessions only on Tuesday 5/22 or put it in the box near EH 4404 on 5/22 by 5:00PM)

Problem 1: (10 pts)

$$\mathrm{u} = \frac{A + jB}{C + jD}$$

A, B, C, and D are real.

a) Find Re(u)
b) Find Im(u)
c) Express u as (X + jY)
d) Express u as (r $e^{j\Theta}$)
e) Find Re(u $e^{j\omega t}$)

Problem 2a: (10 pts)

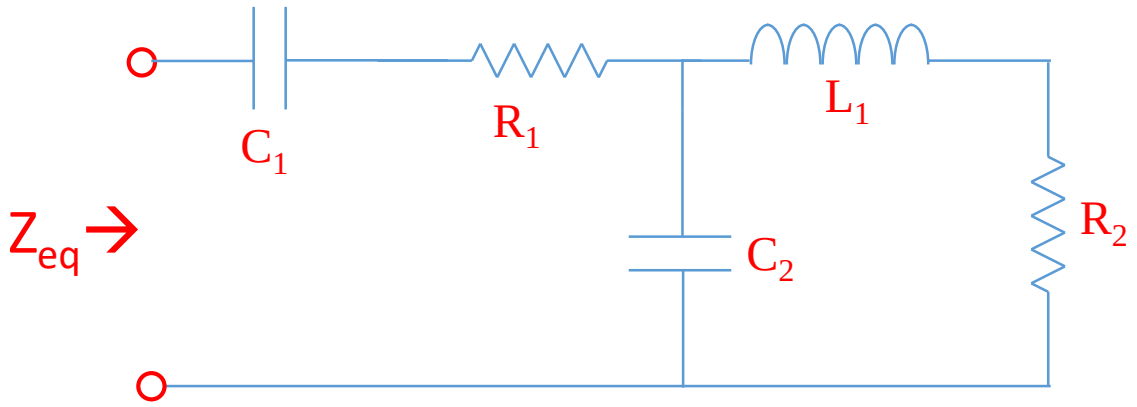
Given v(t) = 10cos(ωt-π/4) volts. Find the phasor **V** that represents v(t). Express **V** as both x+jy and r$e^{j\theta}$.

Problem 2b: (10 pts)

Given i(t) = 2sin(5t+π/6) amps. Find the phasor **I** that represents i(t). Express **I** as both x+jy and r$e^{j\theta}$.

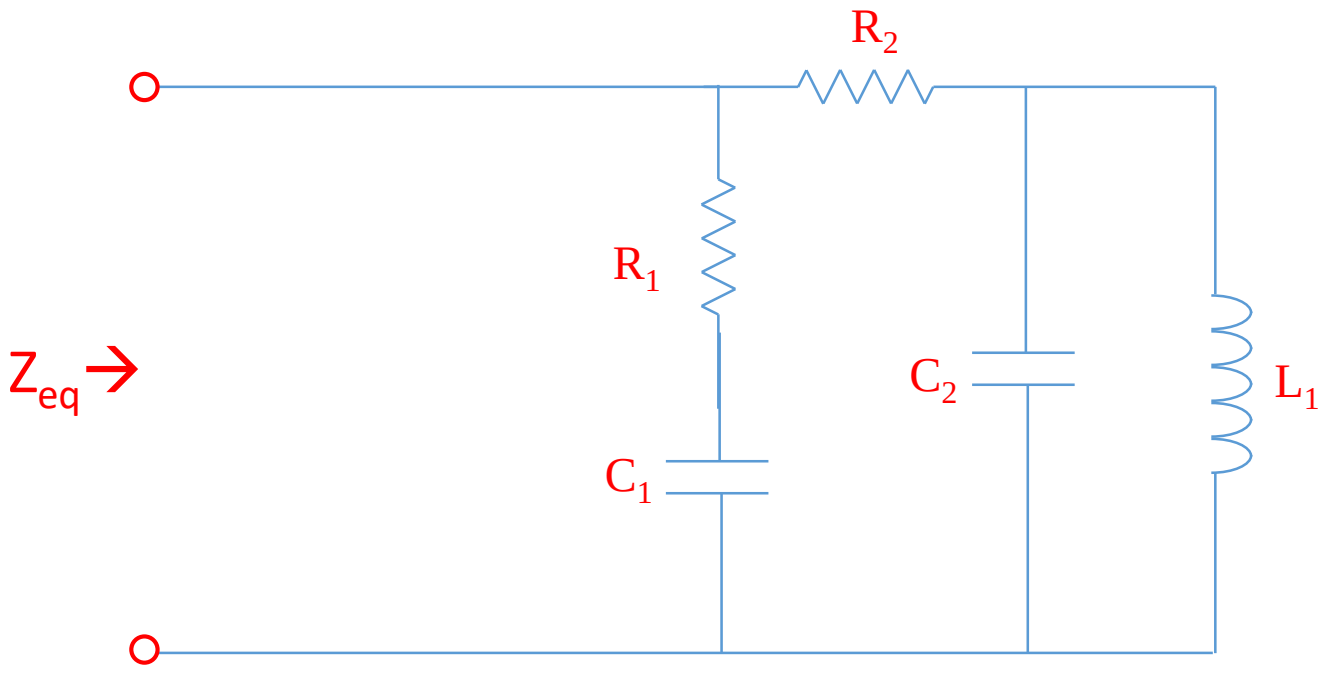
Problem 3a: (10 pts)

Find the impedance Z_{eq} if L is the inductance, C is the capacitance, and R is the resistance. No need to simplify your answer as x+jy or $re^{j\theta}$.



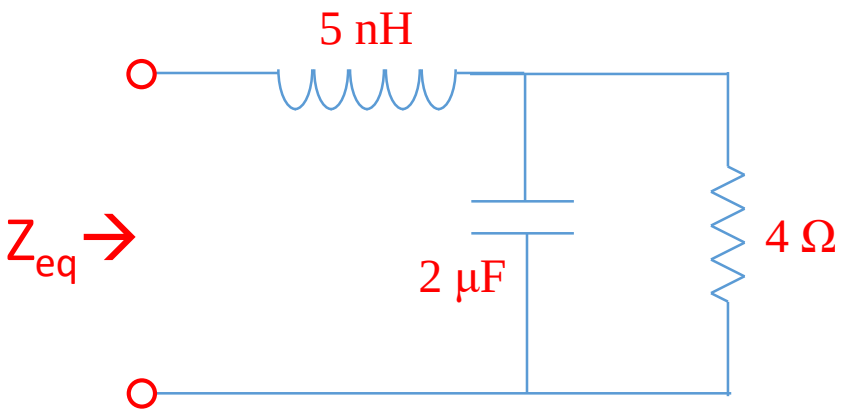
Problem 3b: (10 pts)

Find the impedance Z_{eq} if L is the inductance, C is the capacitance, and R is the resistance. No need to simplify your answer as x+jy or $re^{j\theta}$.



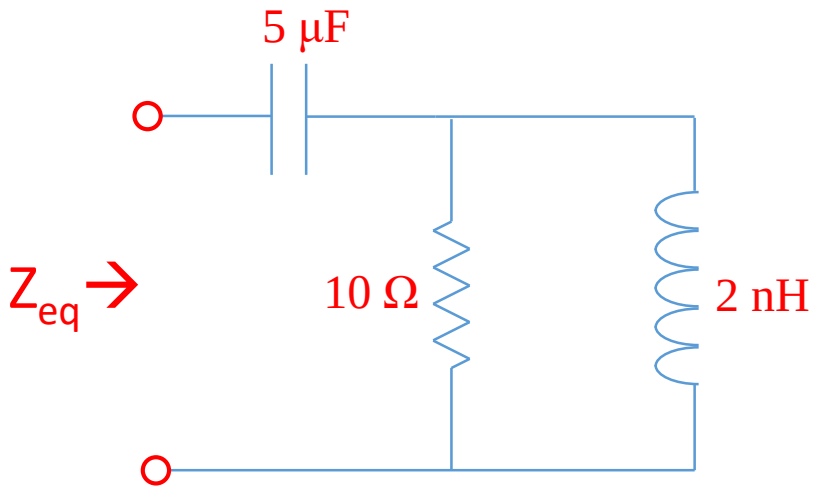
Problem 3c: (10 pts)

Find the impedance Z_{eq} if f = 1 MHz. Express the answer as both x+jy and $re^{j\theta}$.

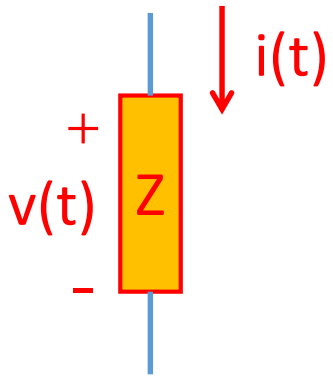


Problem 3d: (10 pts)

Find the impedance Z_{eq} if f = 1 MHz. Express the answer as both x+jy and $re^{j\theta}$.

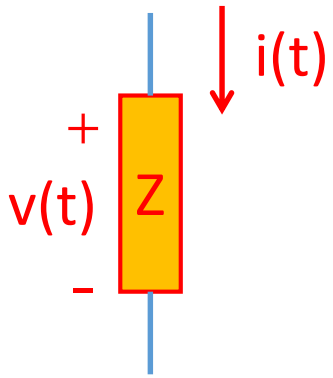


Problem 4a: (10 pts)



Given Z = $3\angle 10^\circ$ ohms. Find i(t) if v(t) = $8\cos(2t+\pi/4)$ volts.

Problem 4b: (10 pts)

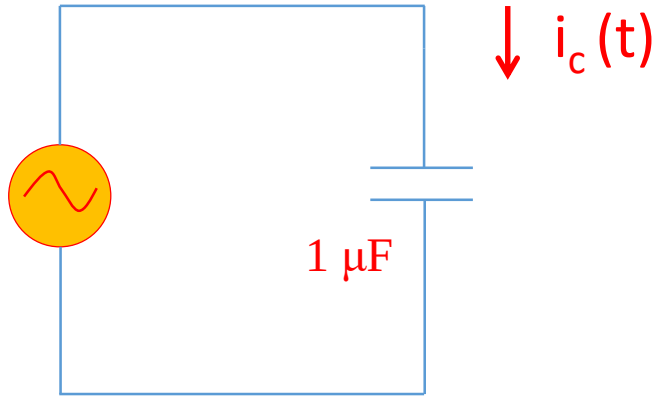


Given Z = 3∠10˚ ohms. Find v(t) if i(t) = 4cos(20t-π/3) amps.

Problem 5a: (10pts)

Find $i_C(t)$. Hint: convert the voltage source into a phasor, then find the current phasor for the capacitor, then convert back to $i_C(t)$.

$V_s(t) = 100\cos(40t + 30^\circ)$ volts



Problem 5b: (10pts)

Find $i_L(t)$. Hint: convert the voltage source into a phasor, then find the current phasor for the inductor, then convert back to $i_L(t)$.

$V_s(t) = 60\cos(10t + 45^\circ)$ volts