1) Equivalent circuits

	par	ser	
C	low	high	pass
L	high	low	

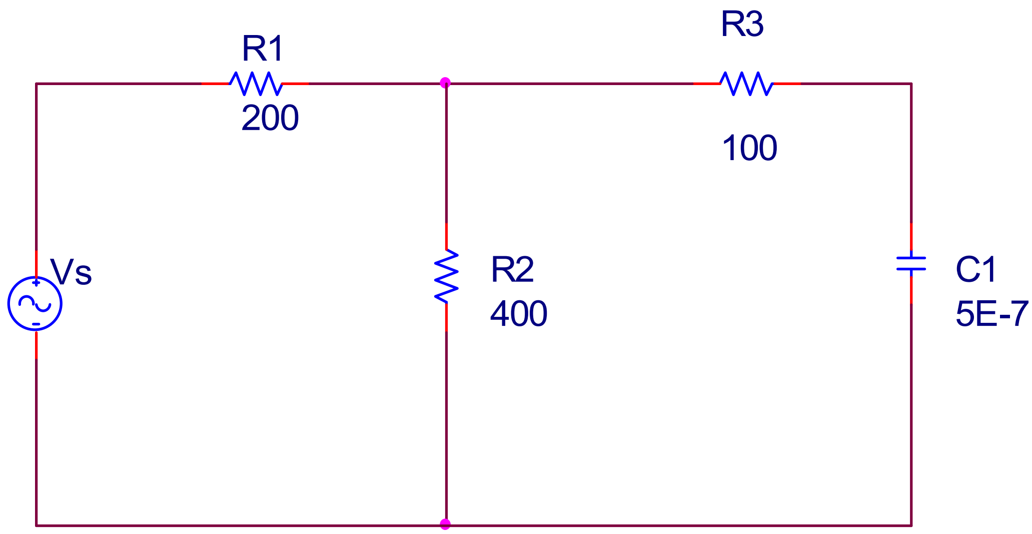
1.1: For $I = 8\angle 45°\text{mA}$ in phasor form with a 1.59kHz frequency, determine the voltage V1 in the time domain form.

w=2pi*f w=10k

d=r/(2pi)*360
r=d/260*2pi

Z=ZR+ZL=6k+j*10k*25m=6k+j250
V=I*Z
V=48.04<47.38
V=48.04*cos(10E3*t+47.38)

2) First order circuits



The source is a 10V sinusoidal signal with a frequency of 636.6Hz and has zero phase.

w=4k

2.1: Determine the phasor expression for the voltage source.

V=10<0

2.2:. Determine the equivalent impedance seen by the source.

Z=Z1+(Z2^-1+(Z3+ZC)^-1)^-1=468.18e^-19.98j

ZC=1/(j*4E3*5E-7)

2.3: Determine the phasor expression for the current through the source.

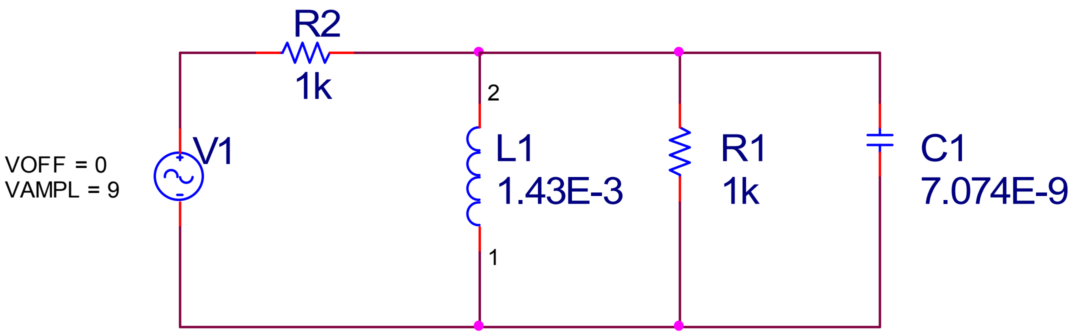
2.4: Determine the phasor expression for the voltage across C1.

2.5: Determine the time domain expression for the voltage across C1.

2.6: Determine the transfer function, H(s) = VC1(s) / Vs(s), for the above RC circuit.

2.7: Verify your soltuion to part d. using the transfer function (remember s = jω in AC steady state).

3) Phasors- RLC



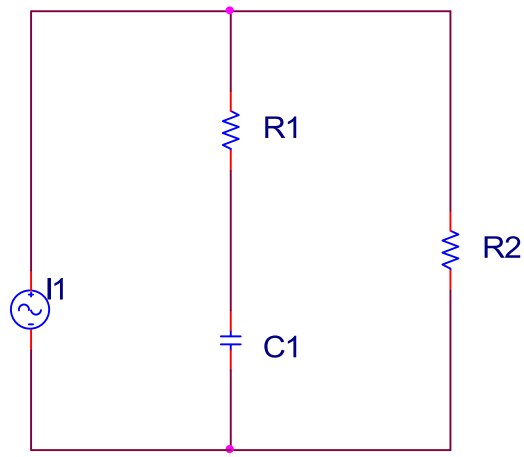
3.1: Using phasor analysis, determine the voltage across the capacitor when the source is 50kHz.

3.2: Using phasor analysis, determine the votlage across the capacitor when the source is 50 Hz. (reminder: -90degrees is -j) ***Partial answer check: ZRLC = 0.45j***

3.3: Using phasor analysis, determine the voltage across the capacitor when the source is 50MHz (50E6Hz).(reminder: 90degrees is j)

4) Transfer functions

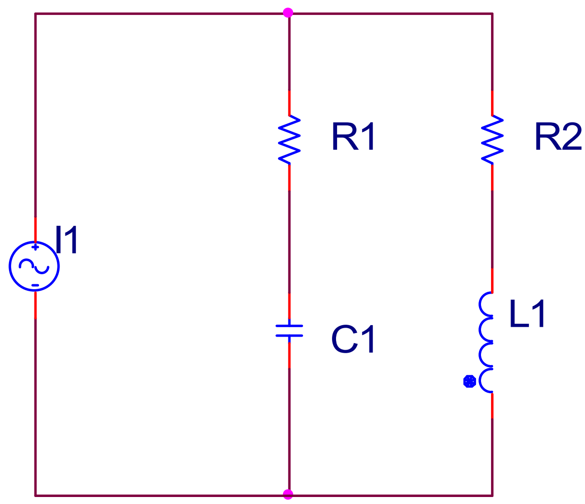
Determine the transfer functions in the following circuit. Determine the behavior of the transfer function as $\omega \to 0$ and $\omega \to \infty$



4.1: Voltage across C1 relative to the source voltage $H(s) = \dfrac{V_{C1}(s)}{I_1(s)}$
Using the current divider formula (then ohms law)

4.2: Determine the magnitude of the transfer function as frequency approaches zero, $|H(s \to 0)|$

4.3: Determine the magnitude of the transfer function as frequency approaches infinity, $|H(s \to \infty)|$



4.4: Voltage across L1 relative to the source curren $H(s) = \dfrac{V_{L1}(s)}{I_1(s)}$

4.5: Determine the magnitude of the transfer function as frequency approaches zero, $|H(s \to 0)|$

4.6: Determine the magnitude of the transfer function as frequency approaches infinity, $|H(s \to \infty)|$