1) Equivalent circuits

	par	ser	
C	low	high	pass
L	high	low	

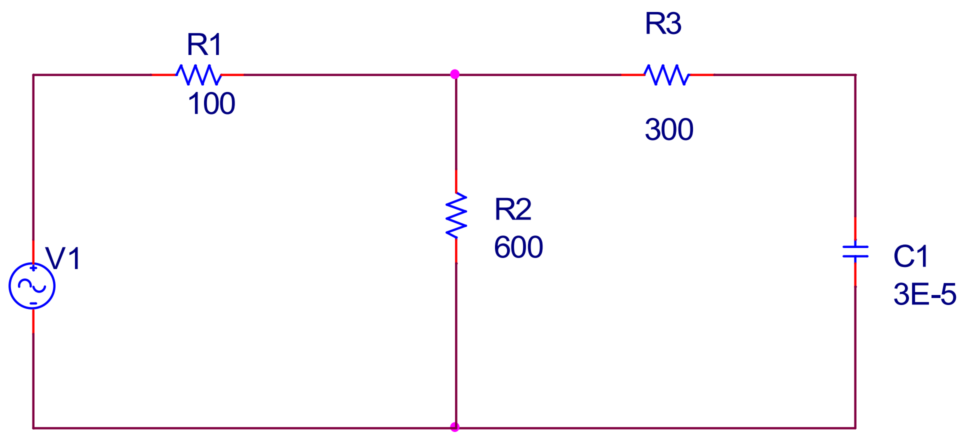
1.1: For $I = 8\angle 45°\text{mA}$ in phasor form with a 1.59kHz frequency, determine the voltage V1 in the time domain form.

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 15V sinusoidal signal with a frequency of 31.83Hz and has zero phase.

w=200

2.1: Determine the phasor expression for the voltage source.

V=15<0

2.2: Determine the equivalent impedance seen by the source.

ZC=1/(j*4E3*5E-5), Z1=100, Z2=600, Z3=321.34<-12.88

Z=Z1+(Z2^-1+(Z3+ZC)^-1)^-1

Z=321.34<-12.88 ohms

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

I=V/Z   I=15<0/321.34<-12.8=0.04667<12.88

I(V)=46.67<12.88 mA

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

IC=I3, IV=I1, I3=I1*Z2/(Z2+Z3+ZC)=0.03060<23.37, V=I*Z=5.10<-66.63

V(C)=5.10<-66.63 V

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

F=A<theta, F(t)=A*sin(w*t+theta)

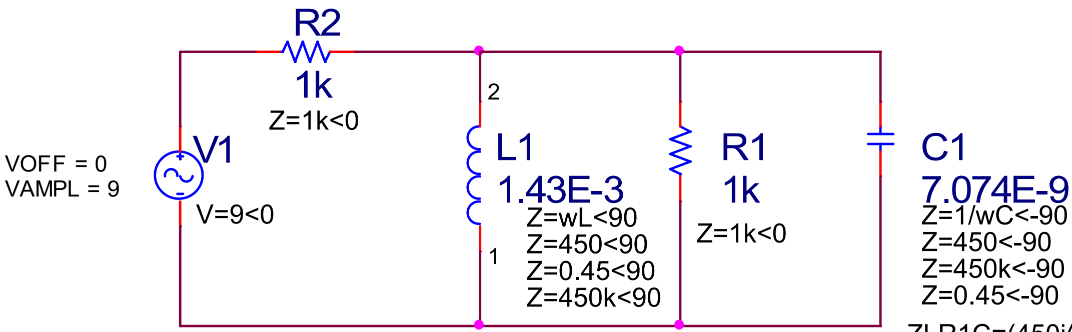
V(C)(t)=5.10*sin(200*t-66.63)

not on test

2.5: Determine the transfer function, H(s) = VC1(s) / Vs(s), for the above RC circuit. VTH=15*600/(600+100)=12.86V, RTH=385.71,

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

3) Phasors- RLC



ZLR1C=(450j^-1+1000^-1-450j^-1)^-1

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

VC=9<0*1000/(1000+1000)<0=4.5<0

w=100k*pi

ZLR1C=1000<0

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***

ZLR1C=(0.45j^-1+1000^-1-450kj^-1)^-1

VC=9<0*ZLR1C/(ZLR1C+1000)<0=0.00045<90

ZLR1C=.450<89.97~=.45<90

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

ZLR1C=(450kj^-1+1000^-1-.45kj^-1)^-1

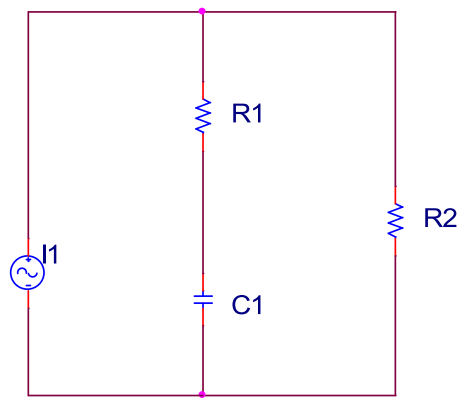
VC=9<0*ZLR1C/(ZLR1C+1000)<0=0.00045<-90

ZLR1C=.450<-89.97~=.45<-90

4) Transfer functions

Determine the transfer functions in the following circuit. Determine the behavior of the transfer function as

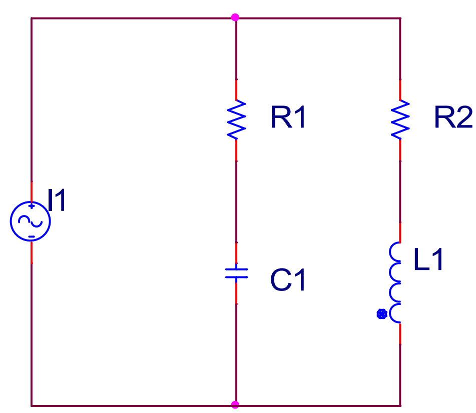
$\omega \to 0$ and $\omega \to \infty$



4.1: Voltage across C1 relative to the source voltage $H(s) = \dfrac{V_{C1}(s)}{I_1(s)}$

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 current $H(s) = \dfrac{V_{L1}(s)}{I_1(s)}$

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, $|H(s \to \infty)|$