EE100 Pre-Lab: **Op Amp Gyrator Circuit Synthesis and Applications**

Name:_________________________

TA: _________________________

Section:________________________

In a sinusoidally exited linear circuit the voltages and currents are *sinusoids* at the *same frequency* as the excitation signal. But the voltages and currents may be *shifted in phase* with respect to the excitation signal. Derive the relationships between voltage phase and current phase of the three basic linear components. The defining equations are

Resistor : $v = R \cdot i$,

Capacitor : $i_C(t) = C \cdot \frac{dv_C(t)}{dt}$,

Inductor : $v_L(t) = L \cdot \frac{di_L(t)}{dt}$

What can be stated for these components concerning only the phases between their voltages and currents?

Which component has impedance dependency on frequency and which one has not?

Which component has low impedance at low frequencies and large impedance at high frequencies?

Which component has high impedance at low frequencies and low impedance at high frequencies?

How can this frequency dependent impedance related to DC analysis and circuit substitutions of the capacitor and the inductor? (e.g. at the steady state the inductor behaves like a short circuit).