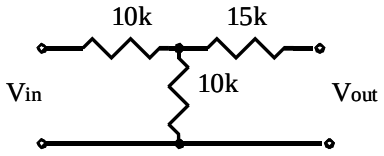
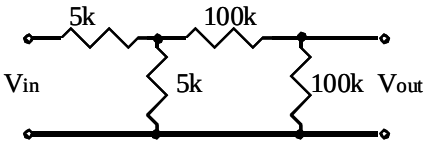
Analog & Digital Electronics

Homework 2: Due Friday, February 16

1. Find the transfer functions for the two circuits below.



1a



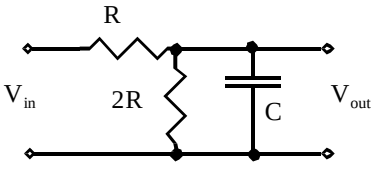
1b

2. Find the magnitude and phase of the complex expression for the H's below, i.e put them in polar form.
   a) H = -6 + 5j
   b) H =.(1-j)(1-j)
   c) H = (1+ 5j)/(1- 5j)

3. Find the magnitude and phase of the complex expression for the H's below, i.e. put them in polar form. Assume ω, τ and t are real. (Don't spend too much time on (b).)
   a) $H = \dfrac{(j\omega\tau)\exp(j\omega t)}{1+ j\omega\tau}$
   b) H = exp(jωt) – 2j exp(–jωt)

4. Find the equivalent impedance of a capacitor, C, and an inductor, L, in series. At what frequency is the impedance 0?

5. Given the circuit at the right, calculate the complex transfer function (as a function of angular frequency ω). Also find its magnitude and phase as a function of frequency. You may find it useful to apply Thevenin's theorem to the source and the two resistors.



6. Given the circuit at the right, calculate the complex transfer function (as a function of angular frequency ω). Also find its magnitude and phase. Note that the box is an inductor. (I can't draw them very well on the computer.) Describe how this circuit will "treat" high and low frequency inputs. At what frequency are the magnitudes of the impedances of the inductor and the resistor the same?