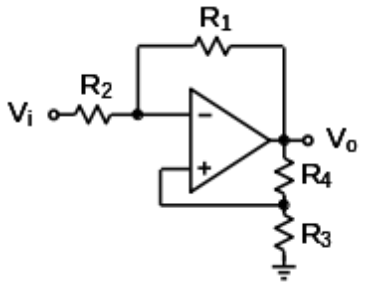
EECE 2412 – Homework 1 – Fall 2018

Due: Wednesday, September 19, 2018

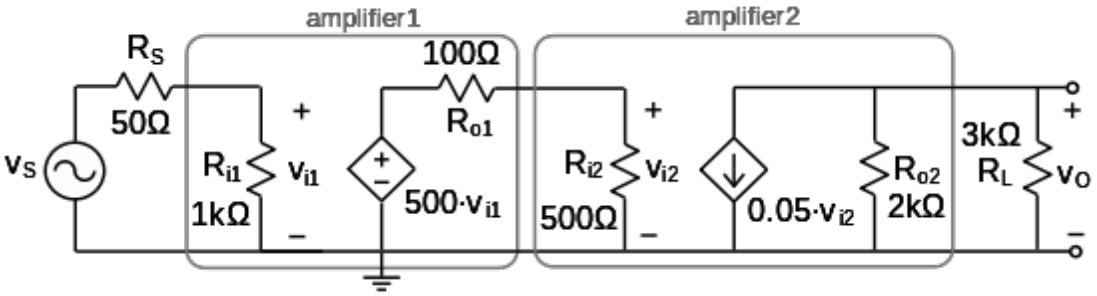
1) Problem 1.18 on page 55 in the textbook. (Allan R. Hambley, Electronics, 2nd edition).

2) Problem 1.27 on page 56 in the textbook.

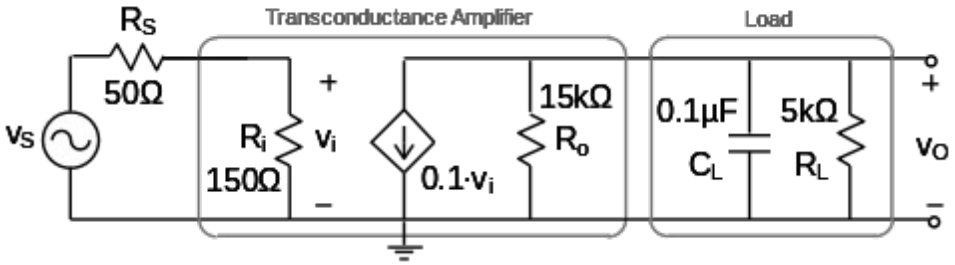
3) Assuming that the op-amp is ideal, find the voltage gain (v_o/v_i) of this circuit:



4) The figure below visualizes a two-stage amplifier that consists of a voltage amplifier and a transconductance amplifier.
   a. Find the values of R_i, R_o, and $A_{vs} = v_o/v_s$ for the two-stage amplifier.
   b. Reverse the order of the cascaded amplifiers (such that amplifier 2 is connected to R_S and amplifier 1 is connected to R_L), and repeat the analysis for the parameters in part a). Compare the results.



5) Analyze the amplifier configuration below, which includes a signal source with 50Ω series resistance, a transconductance amplifier model, and a load consisting of a resistor and capacitor connected in parallel.
   a) Find the frequency-dependent voltage gain $A_{vs}(j\omega) = V_o(j\omega)/V_s(j\omega)$ from the signal source to the load of the amplifier configuration.
   b) What is the 3-dB frequency of the amplifier configuration in Hertz?
   c) What is the approximate gain-bandwidth product (GBW) of the amplifier configuration? You can assume that the transconductance amplifier has an ideal frequency response. In other words, the frequency locations of its internal poles are assumed to be much higher than the GBW of the circuit with load, such that you can model the overall circuit as a single-pole amplifier.



6) Prob. 2.18 on page 123 in the textbook.