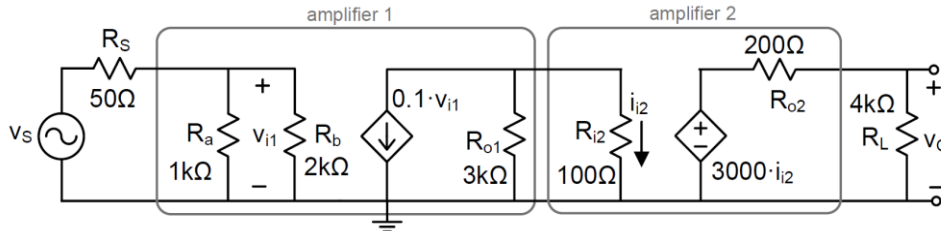


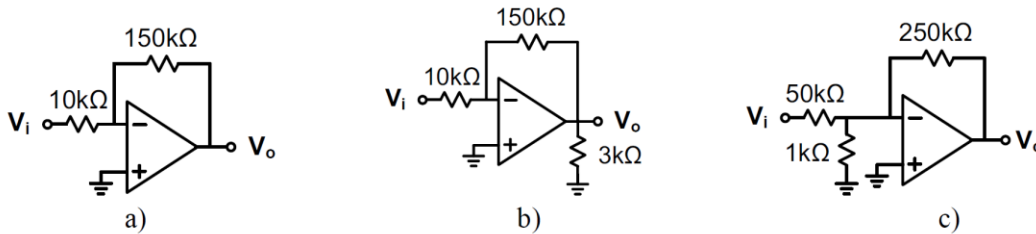
EECE 2412 – Homework 1 – Spring 2017

Due: Thursday, January 26, 2017

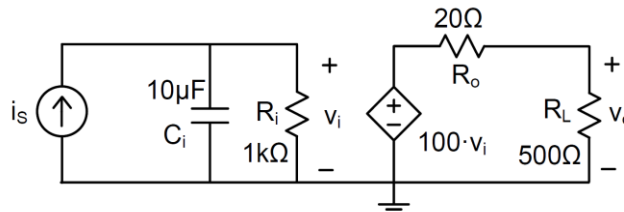
- 1) The figure below displays the model of a two-stage amplifier that consists of a transconductance amplifier (amplifier 1) and a transresistance amplifier (amplifier 2).
 - a. Find R_i , R_o , and $A_{v_s} = v_o/v_s$ (as a ratio and in decibels) for the two-stage amplifier.
 - b. Reverse the order of the cascaded amplifiers, such that amplifier 2 is connected to the 50Ω source resistance and amplifier 1 is connected to the $4k\Omega$ load resistance. Repeat the analysis for the parameters in part a) and compare the results.



- 2) Determine the voltage gain (V_o/V_i) and the input resistance for each of the circuits in the figure below under the assumption that the op-amp is ideal.



- 3) Problem 1.16 on page 55 in the textbook (Allan R. Hambley, Electronics, 2nd edition, Prentice Hall, 1999). Assume that the 5V source voltage is an RMS value.
- 4) Problem 1.27 on page 56 in the textbook.
- 5) Assume that the amplifier modeled by the circuit below is driven with an ideal sinusoidal input current source ($i_s = 2\text{mA} \cdot \sin[\omega_{in}t]$).
 - a. Determine the transfer function $T(j\omega) = v_o(j\omega)/i_s(j\omega)$.
 - b. Evaluate the transfer function for the input frequency of $\omega_{in} = 10$ rad/s, and use the result to determine the equation for the transient output voltage $v_o(t)$ when $i_s = 2\text{mA} \cdot \sin(10 \cdot t)$ is applied as input.
 - c. Repeat part b) for $\omega_{in} = 1000$ rad/s.



- 6) Problem 2.22 on page 123 in the textbook.