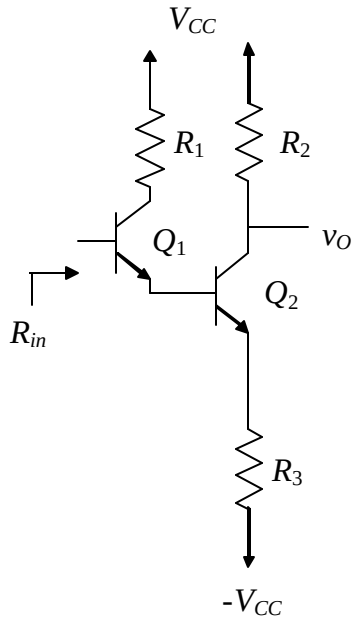
(Due Sept. 21 by 6pm in homework locker)

1. Assume the transistors below have a finite ß and an infinite Early voltage.

Write an expression for the input resistance R_{in} in the circuit shown below. Your expression should include *only* real resistances (R_1, R_2, R_3, or a subset of these) and possibly ß, r_{e1}, and r_{e2}. (Assume both transistors have the same ß.) Circle your answer. *Hint: Use Resistance-Reflection rule*

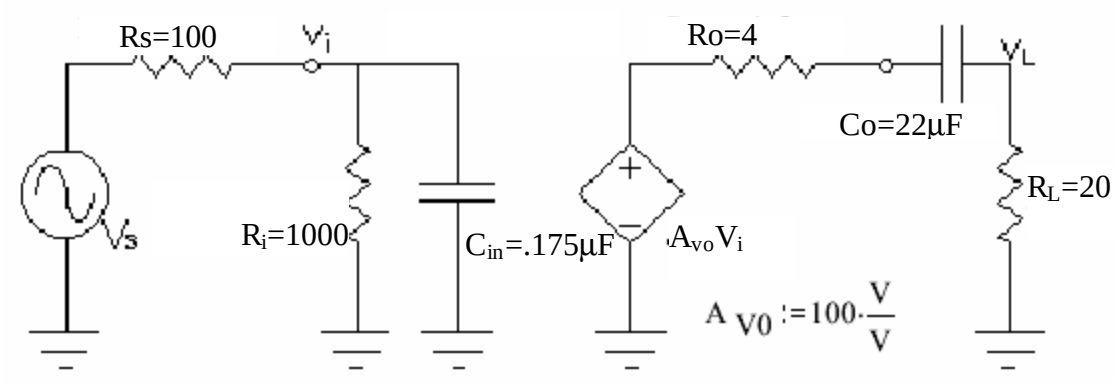


2. An amplifier has the following transfer function:

$$H(s) = \frac{10s^2}{(s/100+1)(s/200+1)(s/10^5+1)}$$

- List the pole frequencies
- List the zero frequencies
- State the midband gain in dB
- Sketch the Bode plots for this system, labeling frequencies, gains, and slopes of interest.

3. Analyze the circuit below to find the overall gain: V_L/V_s. Sketch the Bode plots. Find
   - the midband gain A_M
   - the low-frequency 3-dB point $?_L$
   - the high-frequency 3-dB point $?_H$



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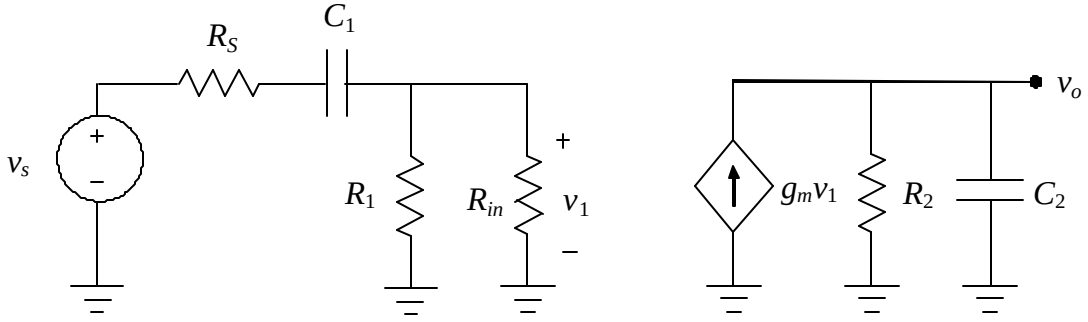
4. For the circuit shown below, derive symbolic expressions for:
   - the midband gain A_M
   - the low-frequency 3-dB point $?_L$
   - the high-frequency 3-dB point $?_H$

Next, state the actual value for all 3 expressions.

- Sketch the Bode magnitude plot
- State the phase angle at a very, very high frequency

To keep the expressions readable, express in parallel resistances as ($R_A \parallel R_B$) for example, *not* $R_AR_B/(R_A + R_B)$.



Let g_m = 1mA/V, R_S=100, C_1=10μF, R_1=100kΩ, R_{in}=100kΩ, R_2=1kΩ, C_2=1μF.
