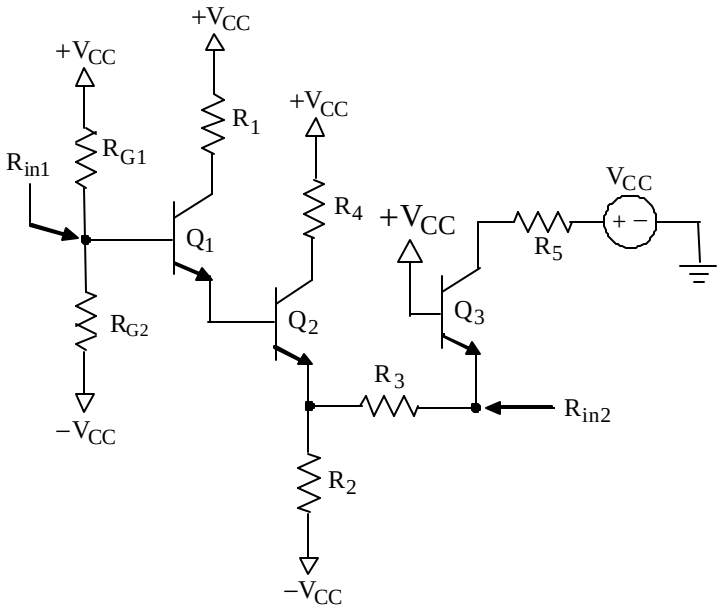
ECE2280 **Homework #7** **Spring 2008**

Assume all transistors are the same and have a finite β and an infinite Early voltage. Your expression should include *only* real resistances (R_1, R_2, R_3, R_4, R_5, R_6, R_{G1}, R_{G2} or a subset of these) and possibly *ß*, r_e, or r_π.

1. Write an expression for the input resistance $\mathbf{R_{in1}}$ in the circuit shown below.
2. Write an expression for the input resistance $\mathbf{R_{in2}}$ in the circuit shown below.



Assume the transistors are identical and β=160, $|V_{BE}|$=0.7.

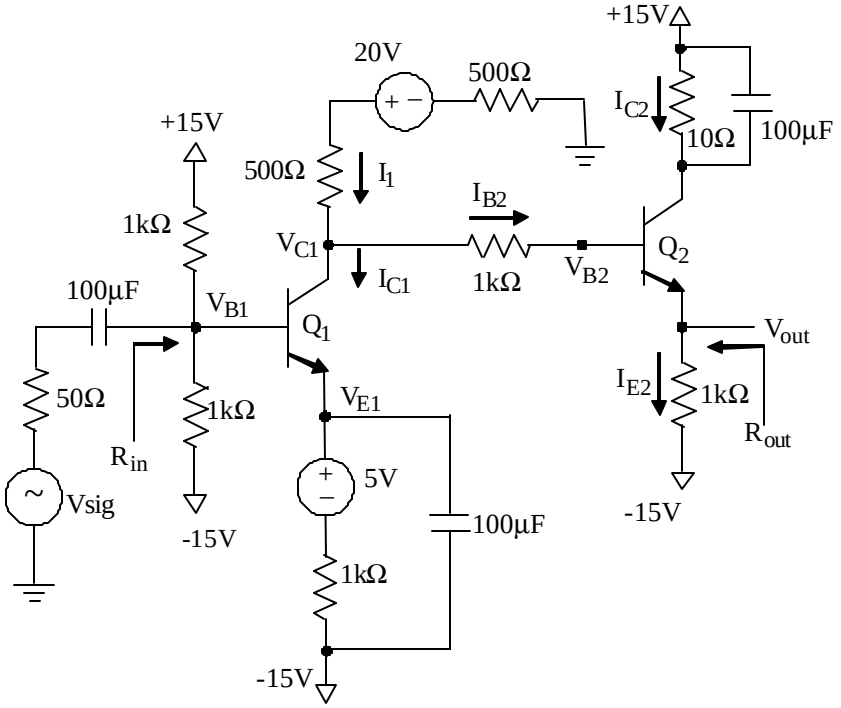
3. Find V_{B1}, V_{C1}, V_{E1}, V_{B2}, V_{out}, I_{C1}, I_1, I_{B2}, I_{E2}, and I_{C2}. Verify the transistors are acting in the active region.

4. Find the three low frequency pole locations. State the value for f_L in Hz.

5. Draw the hybrid-p small signal equivalent circuit. State the type of 2-stage amplifier configuration this is. (e.g. Common Collector-Common Source, Common Base-Common Collector, etc.).

6. Analyze the circuit for Rin and Rout.

7. Analyze the circuit to determine Vout/Vsig.



8. State the resistors that could be changed to increase the overall gain and what value they could be changed (might need to use MATLAB) to achieve a better gain.

9. Explain in your own words and with drawings (show exactly where the parasitic capacitances are located on a cross-sectional view of the transistor) the capacitors that determine the high-frequency pole locations for this circuit.