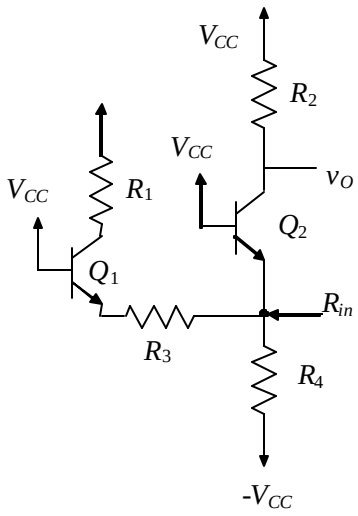
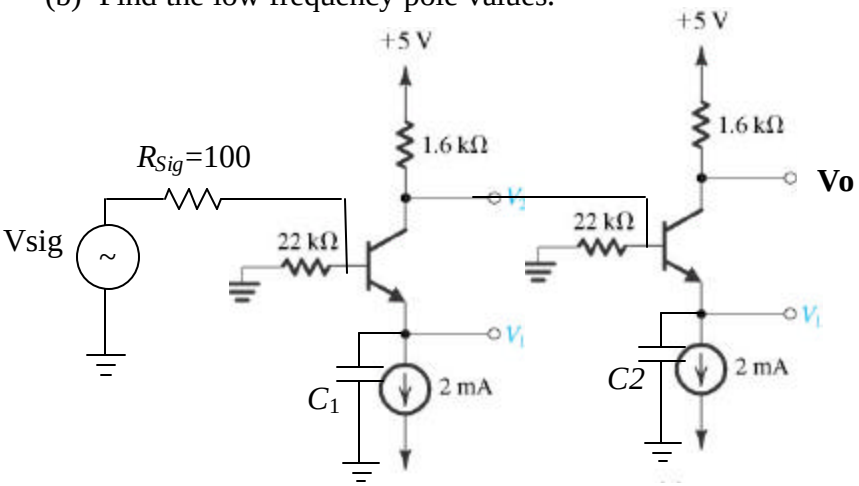
ECE2280 **Homework #8** **Spring 2007**

1. Assume the transistors at the right 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, R_4, or a subset of these) and possibly ß, r_{e1} or $r_{\pi 1}$, and r_{e2} or $r_{\pi 2}$. (Assume all transistors have the same ß.) Circle your answer

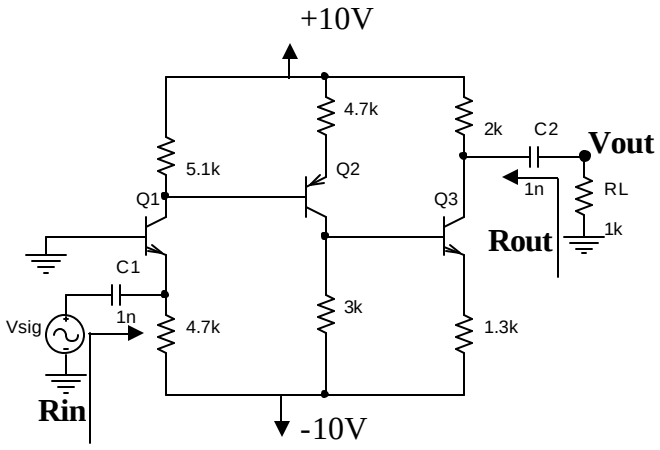


2. The transistors below are identical, use V_{BE}=0.7, β=100, g_m=80m A/V, r_π=1250Ω, C_1=C_2=100µF.
(a) Find the complete frequency response for Vo/Vsig, ignore r_o and the parasitic capacitors.
(b) Find the low frequency pole values.

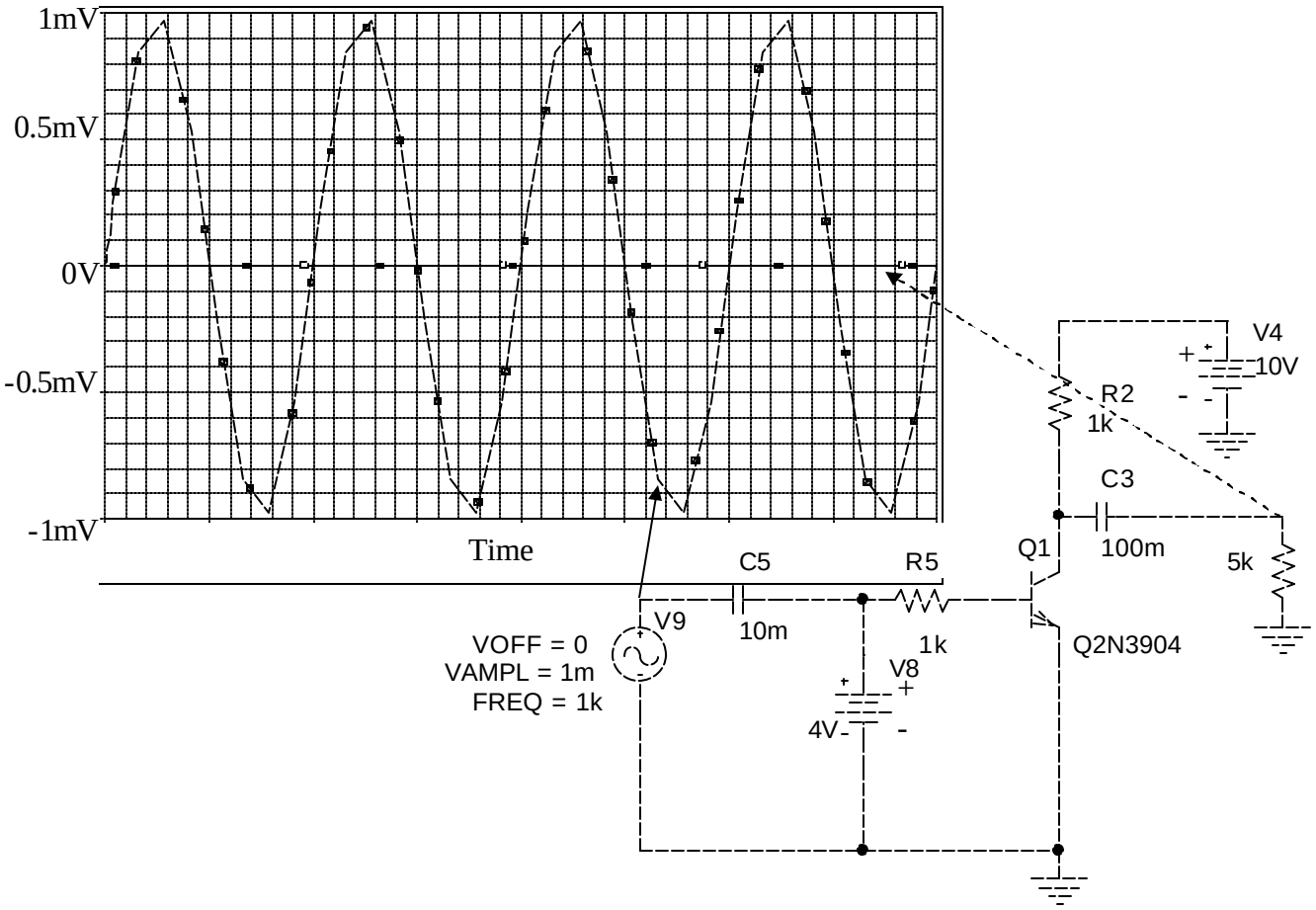


3. Use the following circuit for both problems #3 and #4: β=100, $|V_{BE}|$=0.7 Find V_{E1}, V_{C1}, V_{C2}, V_{E2}, V_{E3}, V_{C3}, I_{E1}, I_{E2}, and I_{E3}.

4. Analyze the circuit to find the midband gain Vo/Vsig, Rin(ignore input source, Vsig), and Rout(ignore RL=1k).



5. The input and output curves vs time are are shown below. Explain in detail why this circuit is not amplifying the signal and is instead 0V. V_{CE_SAT}=0.2V, V_{BE}=0.7V, and β=100.



6. β can range from 40 to 200. For the two extreme values of β(β=40 and β=200) find I_E, V_E, V_B, Rin(ignore the source resistance 10k), and the midband voltage gain Vout/Vsig.