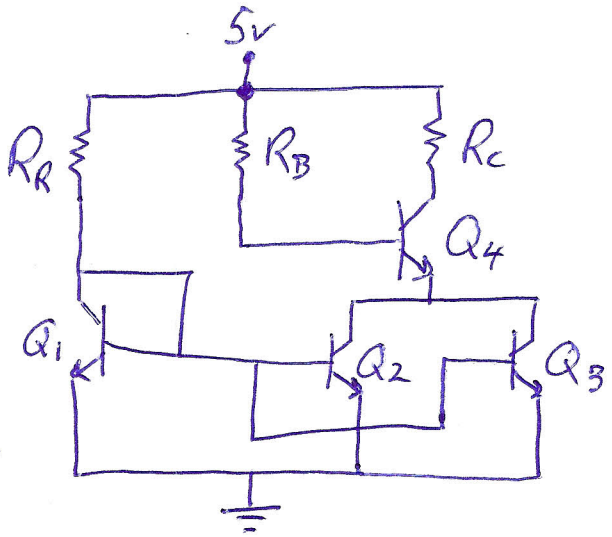
ECE 65 Quiz #3 Spring 2012

Don't Forget:

- Be sure to include units for all numerical results
- Use standard engineering notation, i.e. report 1.5μV, *not* 0.0000015V

Question #1:

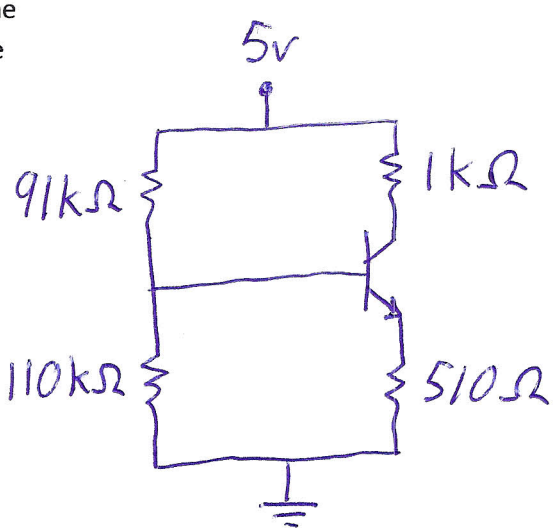
Design the bias circuit shown. Assume β=100 and V_A=infinity. Select values of R_R, R_C, and R_B that cause transistor Q4 to have V_{CE}=2V, and I_C=2mA. Your design should also ensure that the other transistors are in the active mode for the current mirror to work.



Question #2:

For the circuit shown, assume β=100 and V_A=infinity.

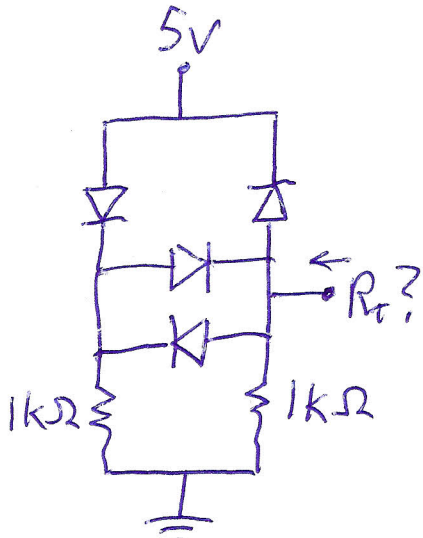
a) Find I_C and V_{CE}
b) Is this circuit stable with respect to variations in V_{BE}? Why or why not?
c) Is this circuit stable with respect to variations in β? Why or why not?



Question #3:

For the circuit shown, assume that the diodes have an ideality factor of n=2.

a) Draw the small signal circuit.
b) Find the small signal Thevenin resistance at the node shown.



Question #4:

For the circuit shown, assume V_{Tn}=1V, and $\mu_n C_{ox}(W/L)$=1 mA/V^2, and V_A=100V.

a) Find g_m and r_0
b) Draw the small signal circuit
c) Find the small signal Thevenin resistance at the node shown.