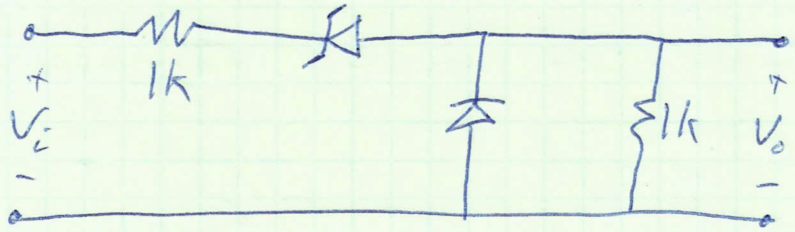
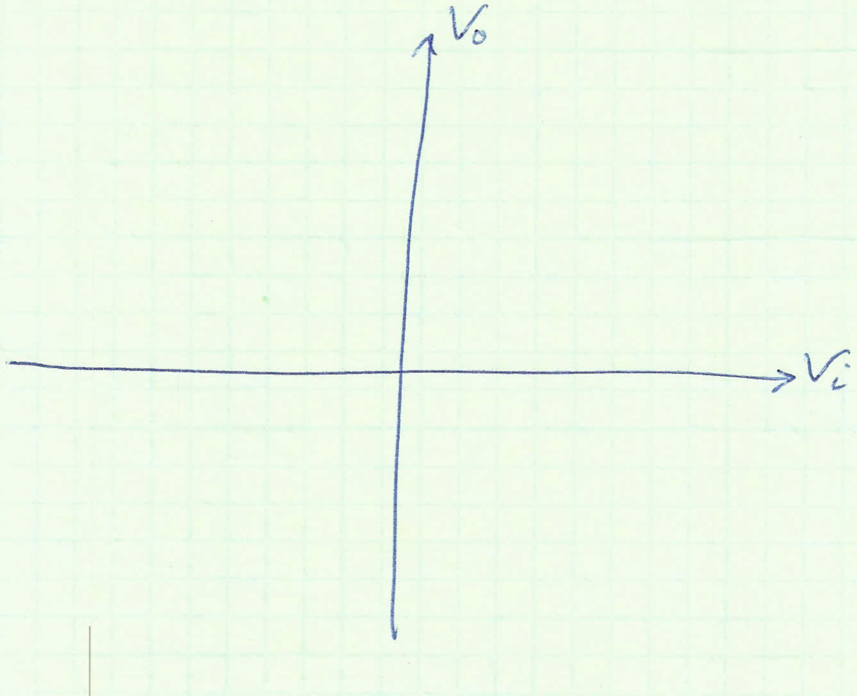
Problem 1:

Find the transfer function, V_o for all possible V_i, and plot it.



$V_{DO} = 0.7v$

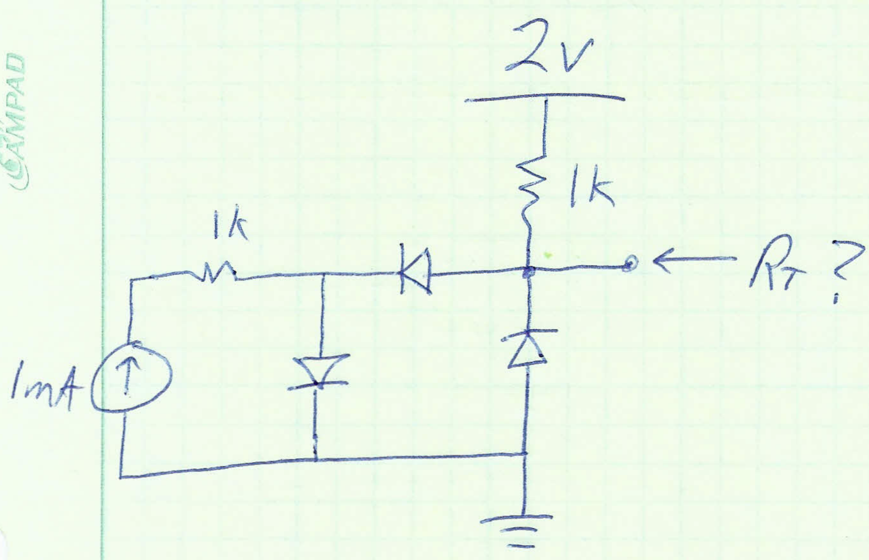
$V_Z = 4v$



Can you solve other similar networks of diodes, zener diodes, and resistors?

Problem 2:

Find the small signal thevenin resistance at the node shown
Assume discrete silicon diodes at 300°K

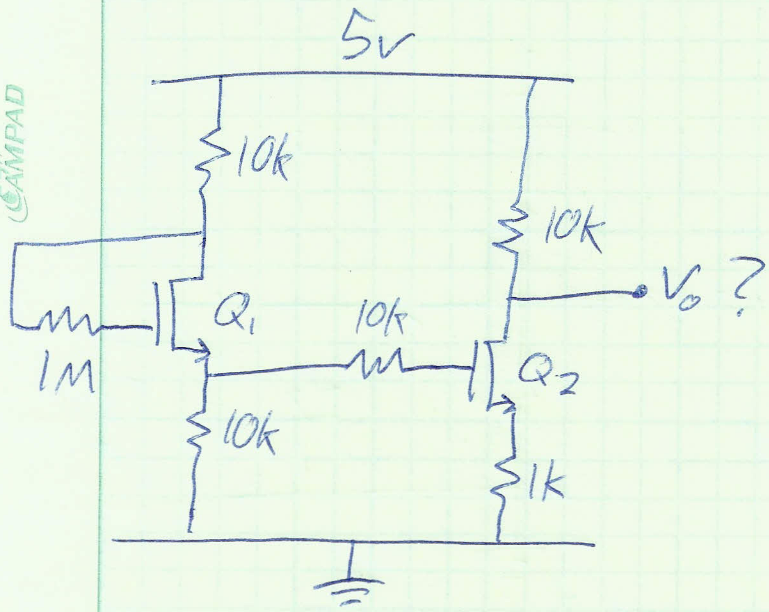


Can you find the small signal model for other networks of diodes, resistors, and current/voltage sources?

Problem 3:

Determine the state of both transistors, and V_o

Assume $k_n' \frac{W}{L} = 1 mA/V^2$ and $V_t = 1v$.

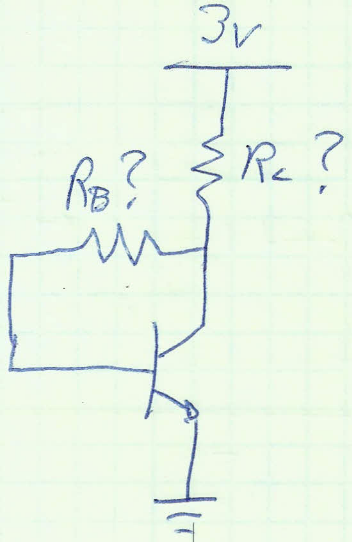


What conditions would put the transistors in different states?

Can you solve similar problems with other bias states and connections? What about BJTs?

Problem 4:

Design the following bias circuit so that it is stable with respect to variations in β from 100 to 200. Also design the circuit so that $I_C = 1mA$.



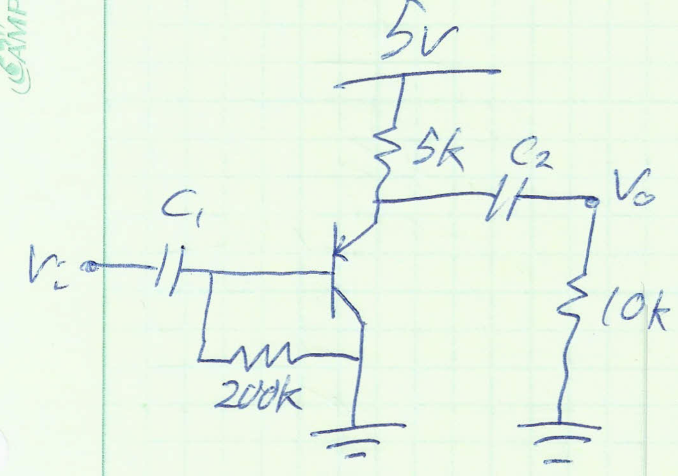
Can you design stable bias circuits for other transistor parameters and bias conditions? Can you design other stable bias circuits?

Problem 5:

Find A_v, R_i, and R_o for the amplifier below.

Assume $\beta = 200$, $V_A = 50v$, and a discrete Silicon BJT at 300°K

Ignore the Early effect for determining bias conditions.



Can you find the amplifier parameters for other types of amplifier circuits? What about with FETs?

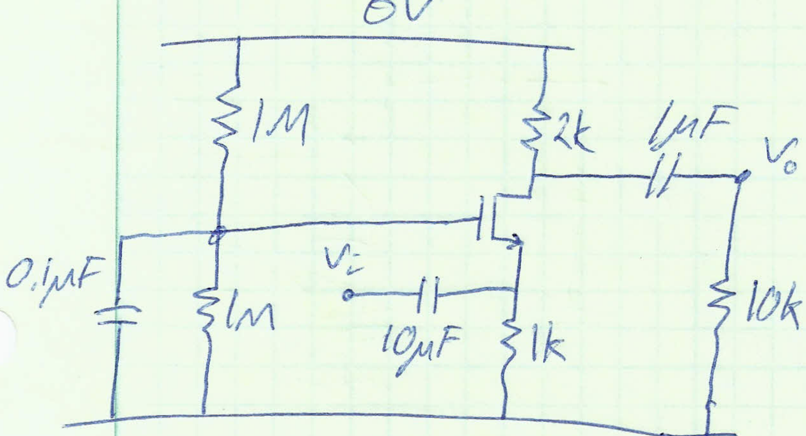
Problem 6:

Determine the low frequency cutoff for this amplifier.

Assume $k_n' \frac{W}{L} = 1mA/V^2$, $\lambda = 0.02V^{-1}$, and $V_t = 1V$

Ignore channel width modulation for determining bias conditions.

Assume $R_{sig} = 0$.



Can you find the low frequency cutoff for other types of amplifier circuits? What about BJTs?