

****8.48** The MOSFETs in the circuit of Fig. P8.48 are matched, having $k'_n(W/L)_1 = k'_p(W/L)_2 = 1 \text{ mA/V}^2$ and $|V_t| = 0.5 \text{ V}$. The resistance $R = 1 \text{ M}\Omega$.

- For G and D open, what are the drain currents I_{D1} and I_{D2} ?
- For $r_o = \infty$, what is the voltage gain of the amplifier from G to D? (*Hint*: Replace the transistors with their small-signal models.)
- For finite r_o ($|V_A| = 20 \text{ V}$), what is the voltage gain from G to D and the input resistance at G?
- If G is driven (through a large coupling capacitor) from a source v_{sig} having a resistance of $20 \text{ k}\Omega$, find the voltage gain v_d/v_{sig} .
- For what range of output signals do Q_1 and Q_2 remain in the saturation region?

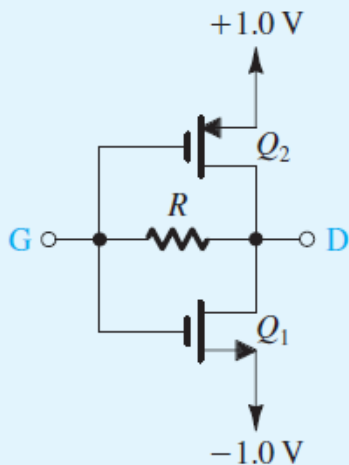


Figure P8.48

8.98 The BJTs in the Darlington follower of Fig. P8.98 have $\beta = 100$. If the follower is fed with a source having a $100\text{-k}\Omega$ resistance and is loaded with $1\text{ k}\Omega$, find the input resistance and the output resistance (excluding the load). Also find the overall voltage gain, both open-circuited and with load. Neglect the Early effect.

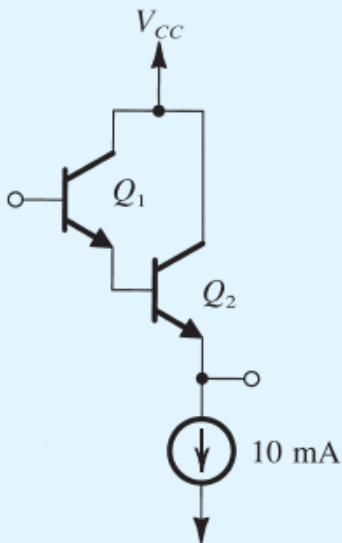


Figure P8.98