D 8.65 Design the cascode amplifier of Fig. 8.30(a) to obtain $g_{m1} = 2 \text{ mA/V}$ and $R_o = 200 \text{ k\Omega}$. Use a 0.18-\mu m technology for which $V_{in} = 0.5 \text{ V}$, $V'_A = 5 \text{ V/\mu m}$, and $k'_n = 400 \text{ \mu A/V}^2$. Determine $L$, $W/L$, $V_{G2}$, and $I$. Use identical transistors operated at $V_{dv} = 0.25 \text{ V}$, and design for the maximum possible negative signal swing at the output. What is the value of the minimum permitted output voltage?

![Image](126x571 to 485x720)

**Figure 8.30** (a) A MOS cascode amplifier with an ideal current-source load; (b) equivalent circuit representation of the cascode output.

D 10.73 It is required to design a cascode amplifier to provide a dc gain of 74 dB when driven with a low-resistance generator and utilizing NMOS transistors for which $V_A = 10 \text{ V}$, $\mu_n C_{ox} = 200 \text{ \mu A/V}^2$, $W/L = 50$, $C_{gd} = 0.1 \text{ pF}$, and $C_L = 1 \text{ pF}$. Assuming that $R_L = R_o$, determine the overdrive voltage and the drain current at which the MOSFETs should be operated. Find the unity-gain frequency and the 3-dB frequency. If the cascode transistor is removed and $R_L$ remains unchanged, what will the dc gain become?