1. Consider the following circuit. (a). Create a truth table for it (b). Provide a plan-view layout for the circuit - make sure to get the body contacts right and “size” the transistors correctly - even though the body contacts aren’t shown in the drawing. Take the mobility ratio between the p- and n-channels to be 2.
2. Consider the following circuit:

![Two stage bipolar amplifier](image)

For $\beta = 150$, find $\frac{v_o}{v_{b2}}, \frac{v_{b2}}{v_{b1}}, \frac{v_{b1}}{v_i}, \frac{v_o}{v_i}$.

Figure 2: Two stage bipolar amplifier

3. Consider the following circuit:

![CS/D MOS amplifier](image)

For the situation shown, $g_m = 1 \text{ mA/V}$ and $r_e = 100 \text{ k}\Omega$. Find $\frac{v_o}{v_i}$. What does the gain become for $R_S = 0$? for $R_S = 3.76 \text{ k}\Omega$.

Figure 3: CS/D MOS amplifier

4. Consider the standard ECL Gate (note: a negative supply!) Assume $V_I$ is -1V. Show that none of the transistors is in saturation. Some hints: One of the transistors (either $Q_a$ or $Q_b$) is in cutoff. Also, remember the $\beta$-multiplication of the emitter resistor when the transistor is in forward active.
Figure 4: A standard ECL gate