Chapter 2: Problem 1 (10 points): Determine noise margins for the inverter with characteristics shown:

\[
V_{oH} = 2.5 \text{ V} \quad V_{oL} = 0.75 \text{ V}
\]
\[
V_{iH} = 1.6 \text{ V} \quad V_{iL} = 1.3 \text{ V}
\]

Then,
\[
N_{MH} = V_{oH} - V_{iH} = 2.5 - 1.6 = 0.9 \text{ V}
\]
\[
N_{ML} = V_{iL} - V_{oL} = 1.3 - 0.75 = 0.55 \text{ V}
\]

Chapter 2: Problem 2 (10 points): Fill in the name of the region that corresponds to the given transistor current expression:

\[
I_{ds} = \begin{cases} 
0 & \text{region = cut-off} \\
\frac{\beta}{2} \left[ (V_{gs} - V_t) V_{ds} - \frac{V_{ds}^2}{2} \right] & \text{region = linear} \\
\frac{\beta}{2} (V_{gs} - V_t)^2 & \text{region = saturation}
\end{cases}
\]

Chapter 2: Problem 2 (10 points): Do the reverse engineering on those two layouts (a) and (b). Draw the schematic diagram for each circuit:

2-input NOR

2-input NAND