1. Logic to Circuit to Layout

Convert the following logical expressions to schematic diagrams for static CMOS logic. Then convert each to a rough layout assuming an n-well process (e.g. p-type wafer: nFETs can be built directly on the wafer); you need only show wells for pFETs. The following is an example:

A. \( \text{out} = \neg (a \cdot b) \)

B. \( \text{out} = \neg ((a \mid b) \cdot c) \)

C. \( \text{out} = \neg (a \cdot b \cdot (c \mid d)) \)

D. \( \text{out} = (a + b); \text{cout} = (a + b = 10_2) \) (carry-out only; no carry-in)

[do the full circuit diagram, but do not spend more than 20 minutes trying to do the layout for this; it is not simple AOI logic … make enough of an attempt to understand the difficulty of dealing with inverted values]
2. **Layout to Circuit to Logic**

A. What logic equations do the following schematics implement?

![Schematic 1]

![Schematic 2]

B. Consider the following stick diagram. Draw the transistor-level schematic. What logic equation does the circuit implement?

![Stick Diagram]
C. Provide a side-view diagram for each of the cuts X and Y through the layout below. Be sure to label each of the strata.

D. What is the logic equation represented by the layout in question C?