

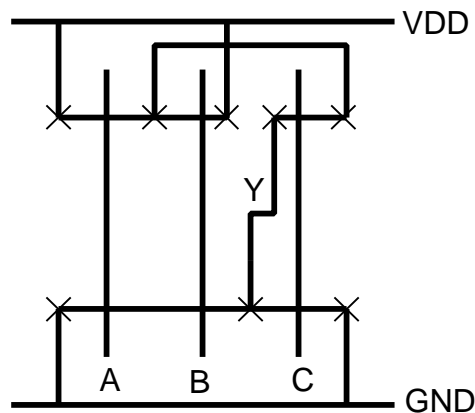
Introduction to CMOS VLSI Design (E158)

Problem Set 1

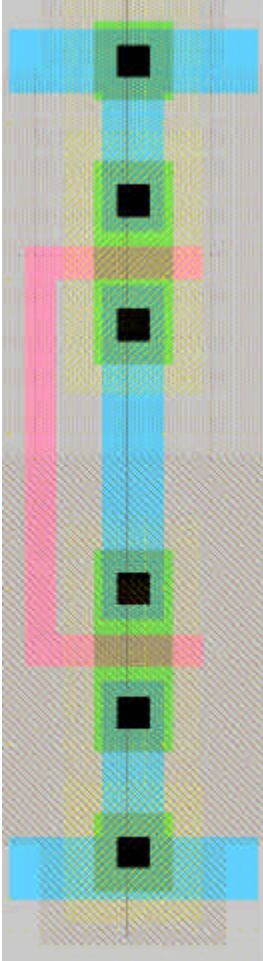


1. Gate Design

- Sketch a stick diagram of an inverter. Please use colored pencils or pens for your diagram.
- Sketch a stick diagram of a 4-input NAND gate.
- Secret Agent E007 found the following stick diagram in the dumpster of the Bad Guy's clandestine engineering outfit. Unfortunately, by the time Agent E007 returned to base, the color information had badly faded. Help our hero work out the Bad Guy's plans by determining the Boolean equation performed by the gate.



2. Cross Section



Draw a cross-sectional view of this inverter for a cut taken along the black line. Label your sketch. Assume you are using a process with a p-type substrate and an N-well. This picture is available in color on the class web page.

3. Latchup

- Briefly define latchup as applied to a CMOS process. What causes latchup?
- What can you do in your designs this semester to avoid latchup.

4. Time

- Please indicate how many hours you spent on this problem set. This will not affect your grade, but will be helpful for calibrating the workload for the future.