

## CSE 493/593 FALL 2024 HOMEWORK 1

1. Given in Fig. 1 is the Voltage Transfer Characteristics of an inverter. Calculate the  $NM_L$  and  $NM_H$ .

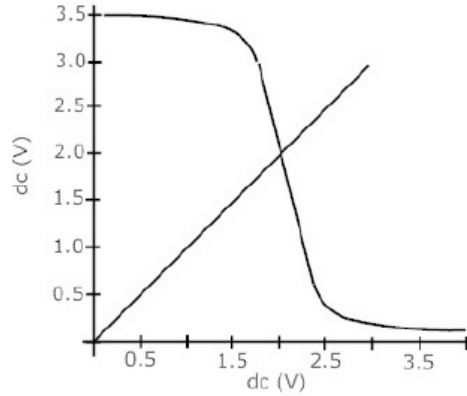


Fig. 1

2. Implement the given logic function using Complementary CMOS Logic.  
 $f = \overline{((AB)+C)D}$
3. Consider the following stick diagram. Draw the electrically equivalent transistor-level schematic. What logic equation does the circuit implement?

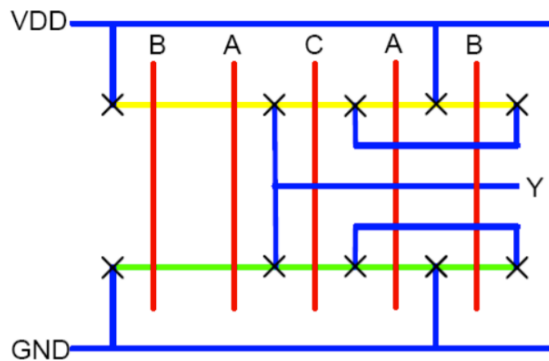


Fig. 2

4. Design a Half Adder (Sum and Carry) using Complementary CMOS Logic. [Hint: Derive logic expressions first]
5. Design a 4x1 multiplexer using Transmission Gate Logic. Considering inputs A, B, C, D; Select lines: S1, S2; Output: Out
6. The figure shows the input and output signals of a CMOS inverter. Calculate the following using the time instances mentioned in the figure.
- Fall time
  - Rise time
  - Propagation delay

