1. The voltage transfer characteristics for an inverter are shown in Fig. 1. What are NM<sub>L</sub> and NM<sub>H</sub> of the inverter?

![Fig. 1 Transfer characteristics of an inverter](image)

2. Draw the transistor level schematic diagram of the CMOS gate that implements function Z:
   a. \( Z = A' \cdot B \cdot C + D + E' \)
   b. \( Z = (A \cdot B' \cdot C' + D)' \)
   Assume that the Primary Inputs available are A, B, C, D and their complements.

3. Consider the circuit in Fig.2.
   (a) What is the logic function implemented by this circuit?
   (b) How would you implement this function with PMOS-only switches? Assume both true and complimentary input signals are available.
4. Assume inputs and its complements are available. If a Boolean function is $D = A'B'C + AB'C + AC' + B'C'$, then:

(a) Implement the function using transmission gate and draw the transistor level schematic diagram.

(b) Implement this function using a compound CMOS gate and draw the transistor level schematic diagram.