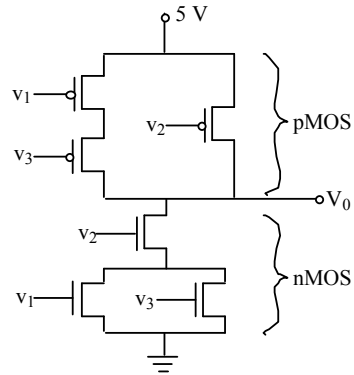


Problem 4 (20 points)

a) (10 pts.) Complete the truth table for the CMOS circuit below. A low voltage is a logic “0” and a high voltage is a logic “1.”

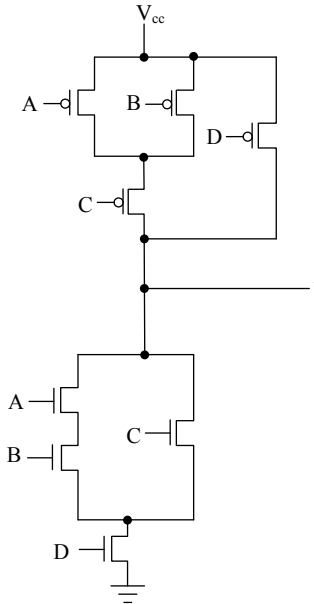
V_1	V_2	V_3	V_0
0	0	0	
0	0	1	
0	1	0	
0	1	1	
1	0	0	
1	0	1	
1	1	0	
1	1	1	



b) (10 pts.) For the given truth table, draw the CMOS circuit that implements the logic function specified by the truth table below.

V_1	V_2	V_0
0	0	1
0	1	0
1	0	0
1	1	0

Problem 5 [20 points]



Circuit for \bar{Y}

(a) [15 pts.] What logic function is implemented? Choose one of the following and explain. You must show work to justify your answer!

$Y = ((A + B) \cdot C) + D$

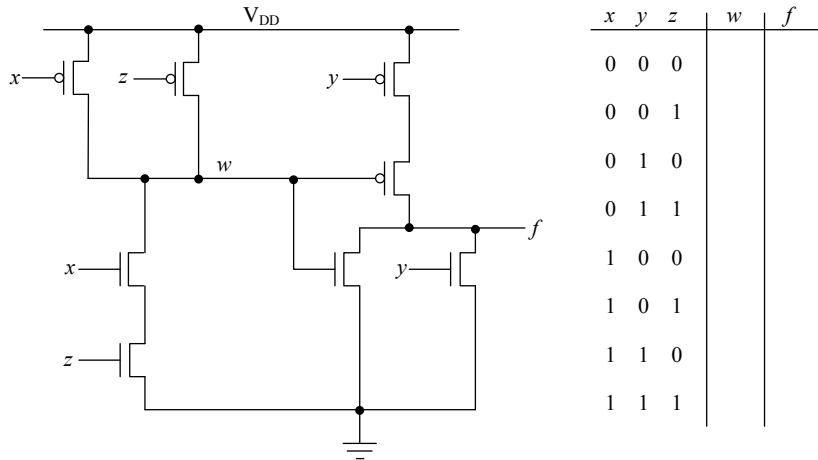
$Y = (\bar{A} \bar{B} + C) \bar{D}$

$Y = (A \cdot B + C) \cdot D$

$Y = ((\bar{A} + \bar{B}) \cdot \bar{C}) + \bar{D}$

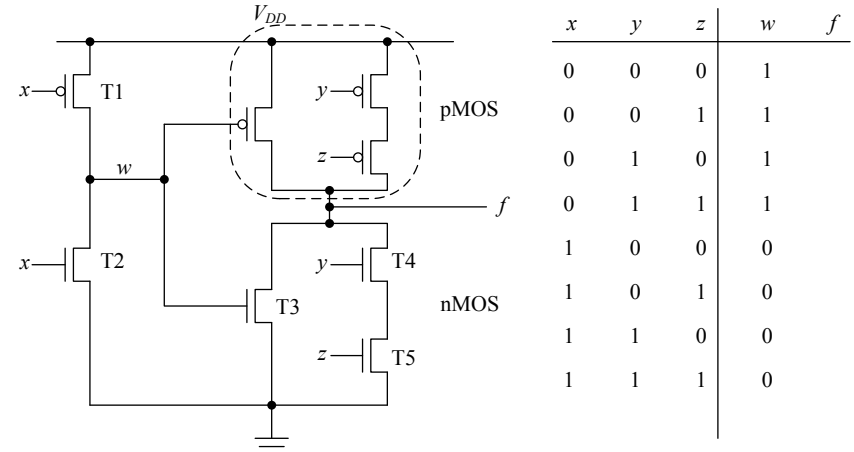
(b) [5 pts.] Draw a CMOS circuit that produces \bar{Y} . Draw the circuit in the box above.

Problem 3 (20 points) The CMOS circuit below has Boolean inputs x and y and z , and a Boolean output f .



Complete the truth table for values of w and f . Unclear entries will be marked as incorrect. Explain your reasoning. For example, “ f is low (0) when...”.

Problem 3 (20 points) In the CMOS circuit below, the nMOS part is correct, but the enclosed pMOS part is incorrect.



(a) [8 pts.] Complete the truth table for the value of f .

(b) [4 pts.] Explain **in words** how the table for w was obtained.

w is high (1) when _____ because _____

w is low (0) when _____ because _____

(c) [8 pts.] Draw the correct pMOS portion of the circuit that corresponds to the nMOS portion. Label the inputs w , y , and z clearly.

