

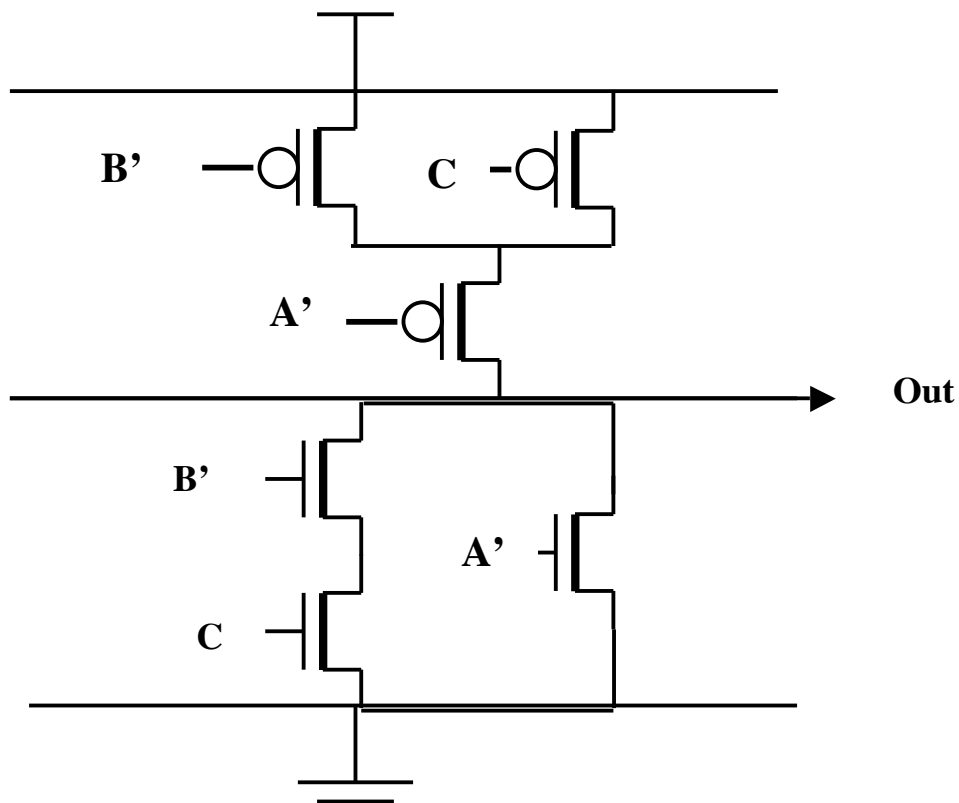
ECE2030b HW-3 Due Wed. Sept.18, 2002 in class.

Simplify the Boolean expression: $Out = ABC + AC' = A(BC+C') = A(B+C')$

Complete the truth table. [**Bonus: Expand to minterms: $ABC + ABC' + AB'C'$** (7,6,4)]

A	B	C	Out
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1

Draw the CMOS transistor diagram. Assume A, A', B, B', C, C' signals are available.



Given the truth table.

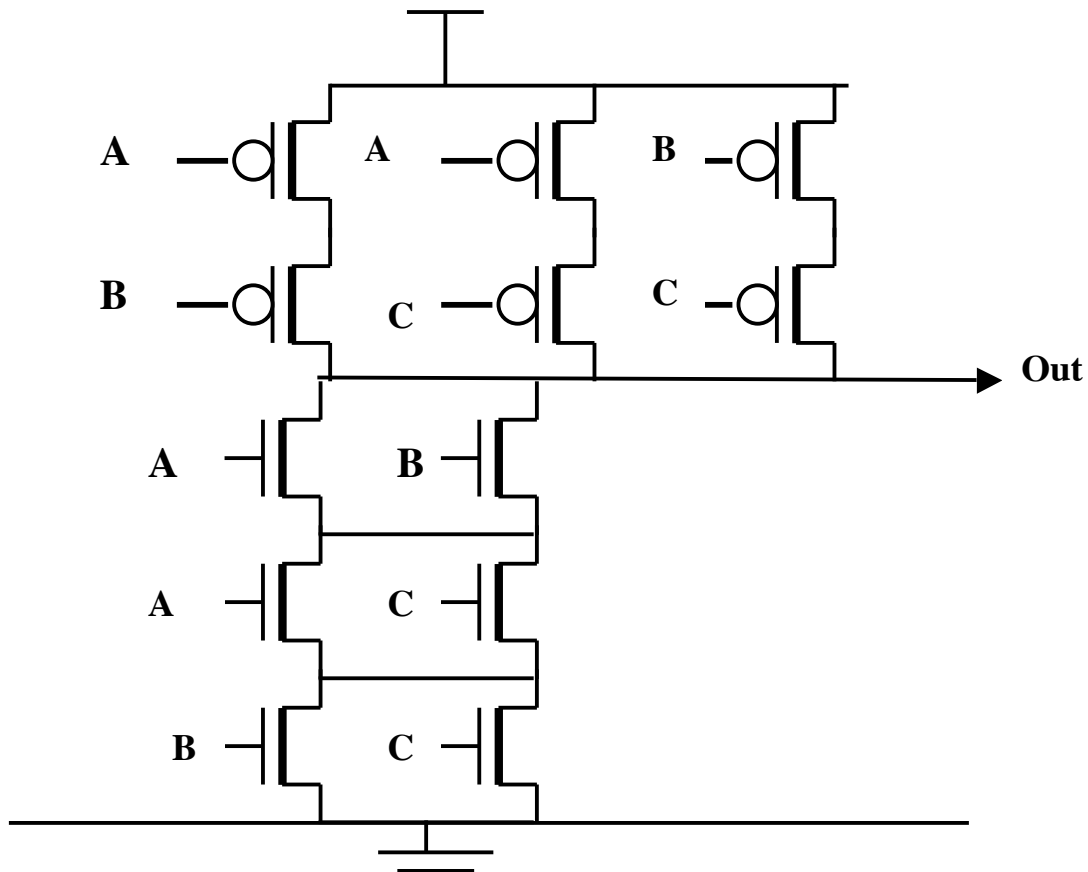
A	B	C	Out
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	0

Write the Boolean expression as 3 terms:

$$\begin{aligned}
 \text{Out} &= A'B'C' + A'B'C + A'BC' + AB'C' = A'B' + (A'B + AB')C \\
 &= (A'B'C' + A'B'C) + (A'B'C' + A'BC') + (A'B'C' + AB'C') \\
 &= A'B' + A'C' + B'C'
 \end{aligned}$$

Draw the CMOS transistor diagram. Assume A, A', B, B', C, C' signals are available.

(DO YOU SEE A WAY TO ELIMINATE 2 FET'S)



Bonus – use a Karnaugh map to find the simplest logic expression for Problem 3. There are three Essential Prime Implements, $A'C'$ (blue), $B'C'$ (green), and $A'B'$ (red).

A \ BC	00	01	11	10
0	1	1	0	1
1	1	0	0	

A Karnaugh map for a 3-variable function with variables A, B, and C. The map is a 2x4 grid. The columns are labeled 00, 01, 11, and 10. The rows are labeled 0 and 1. The cells contain the following values: (0,00)=1, (0,01)=1, (0,11)=0, (0,10)=1, (1,00)=1, (1,01)=0, (1,11)=0, (1,10)=0. Three essential prime implicants are circled: a blue circle around the top-left and top-right cells (A'C'), a green circle around the top-left and bottom-left cells (B'C'), and a red circle around the top-left and top-middle cells (A'B').