WE4.1

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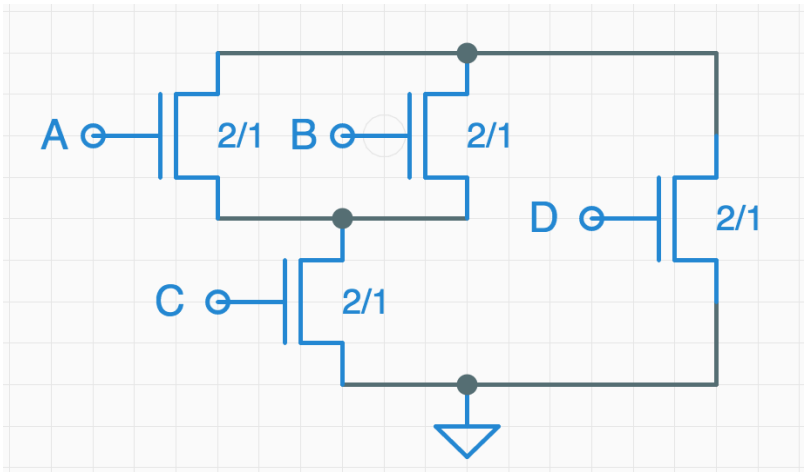
Video explanation of solution is provided below the problem.

Truth Tables

16/16 points (ungraded)

Given the CMOS circuit with pulldown shown here, and assuming that the pullup is drawn correctly, fill in the truth table for this circuit.



A	B	C	D	F
0	0	0	0	1 ✔ Answer: 1
0	0	0	1	0 ✔ Answer: 0
0	0	1	0	1 ✔ Answer: 1
0	0	1	1	0 ✔ Answer: 0
0	1	0	0	1 ✔ Answer: 1
0	1	0	1	0 ✔ Answer: 0
0	1	1	0	0 ✔ Answer: 0
0	1	1	1	0 ✔ Answer: 0
1	0	0	0	1 ✔ Answer: 1
1	0	0	1	0 ✔ Answer: 0
1	0	1	0	0 ✔ Answer: 0
1	0	1	1	0 ✔ Answer: 0
1	1	0	0	1 ✔ Answer: 1
1	1	0	1	0 ✔ Answer: 0
1	1	1	0	0 ✔ Answer: 0
1	1	1	1	0 ✔ Answer: 0

Explanation

From the pulldown circuit, we can generate the corresponding function that the CMOS circuit represents. Th
pulldown tells us that $\overline{F} = (A + B)\,C + D$. So $F = \overline{((A + B)\,C + D)}$.

Calculator

We can then plug in the given input values to determine the value of F for each combination. When A=0 B=0 C=0 and D=0, then (A+B)C = 0 that ORed with D = 0, and finally the entire thing is negated, so F = 1.
For A=0 B=0 C=0 and D=1, (A+B)C = 0 + D=1 gives us 1 and the whole thing negated is F=0. In the same way, we can complete the rest of the truth table, and we get 1 0 1 0 0 0 1 0 0 0 1 0 0 0 for the remaining entries.

Submit

Answers are displayed within the problem

Truth Tables

1/1 point (ungraded)
Can the function F defined by the following truth table be implemented as a single CMOS gate?

A	B	C	F
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	0

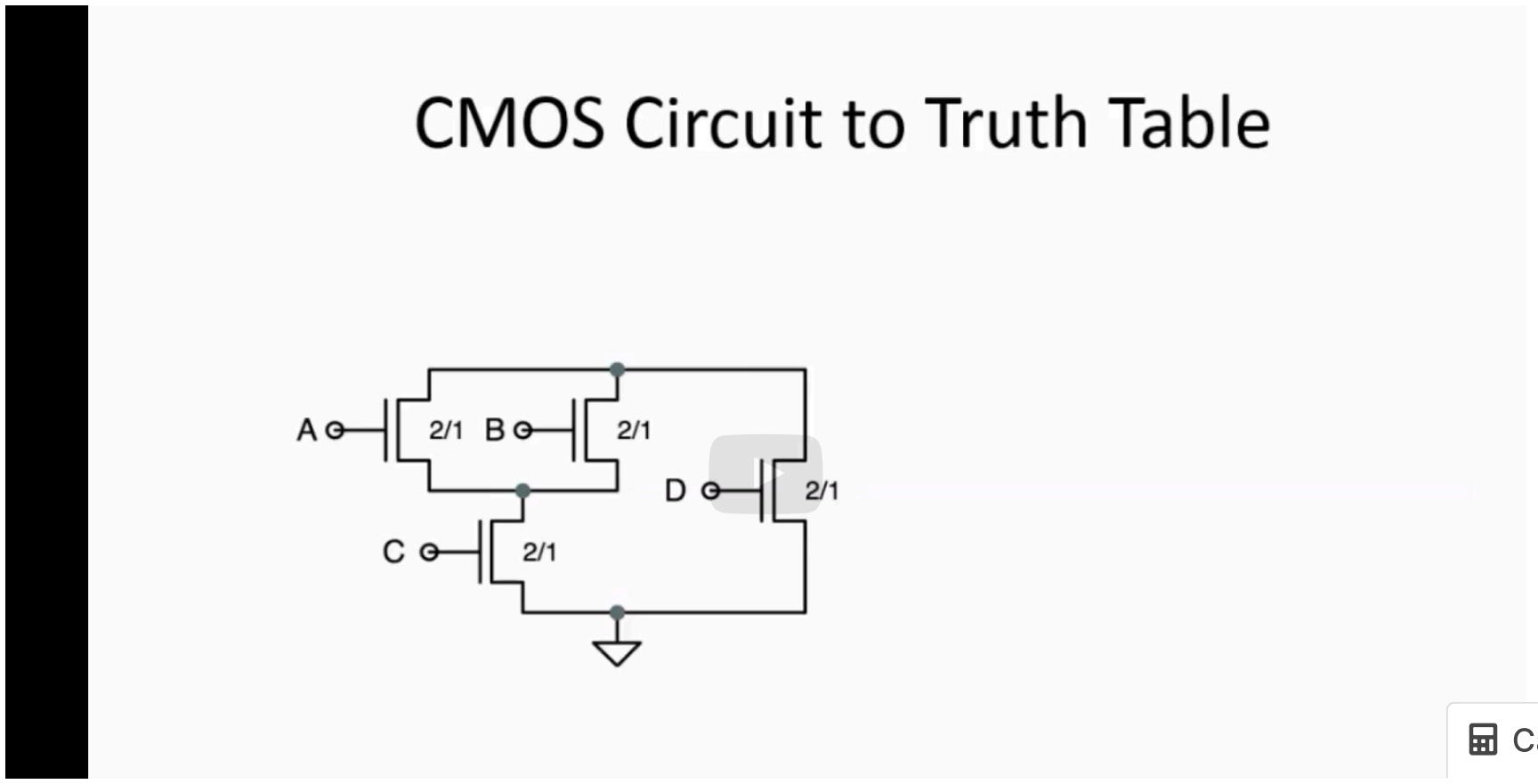
Can F be implemented as a single CMOS gate?

- NO
- YES ✔

Submit

✔ Correct (1/1 point)

Truth Tables



Calculator

Video

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? Dont't actually understand what is the definition of "a single cmos gate" — 2
A circuit with only nfet as the pull-down part and pfet as the pull-up part could be defined as a single cmos gate ?

F ? — 2
Hi, so where is F ?

confused? — 3
Hi, In the second question, why ~A ~B + ~A B + A ~B could be transform into ~A ~B + A ~B + ~A B + ~A ~B ? I got confused here. t...

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