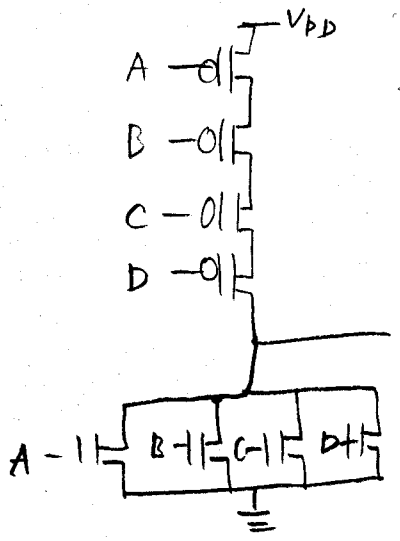
CpE 111 HW #6 Solutions.

1 NOR4.

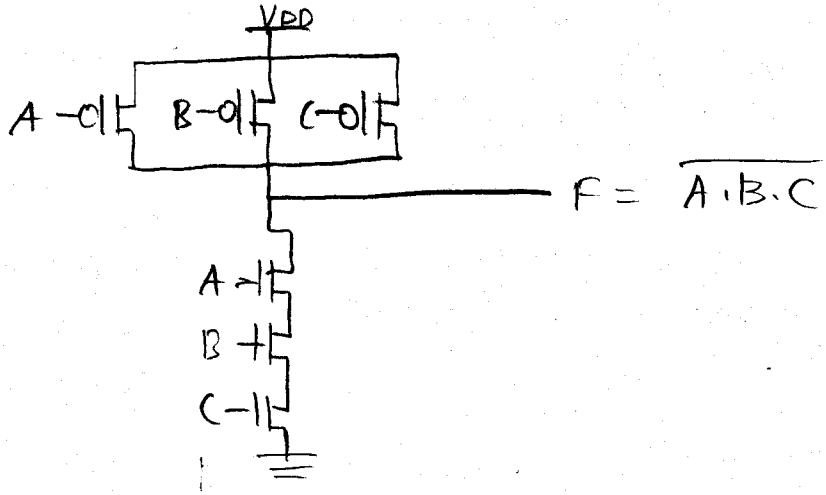


⇒ 4 PFETs in series in pull-up network.

$F = \overline{A+B+C+D}$

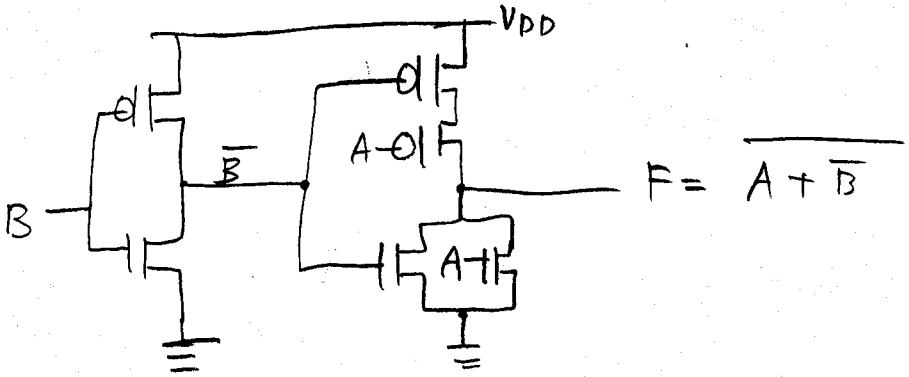
⇐ 4 nFETs in parallel in pull-down network.

NAND3



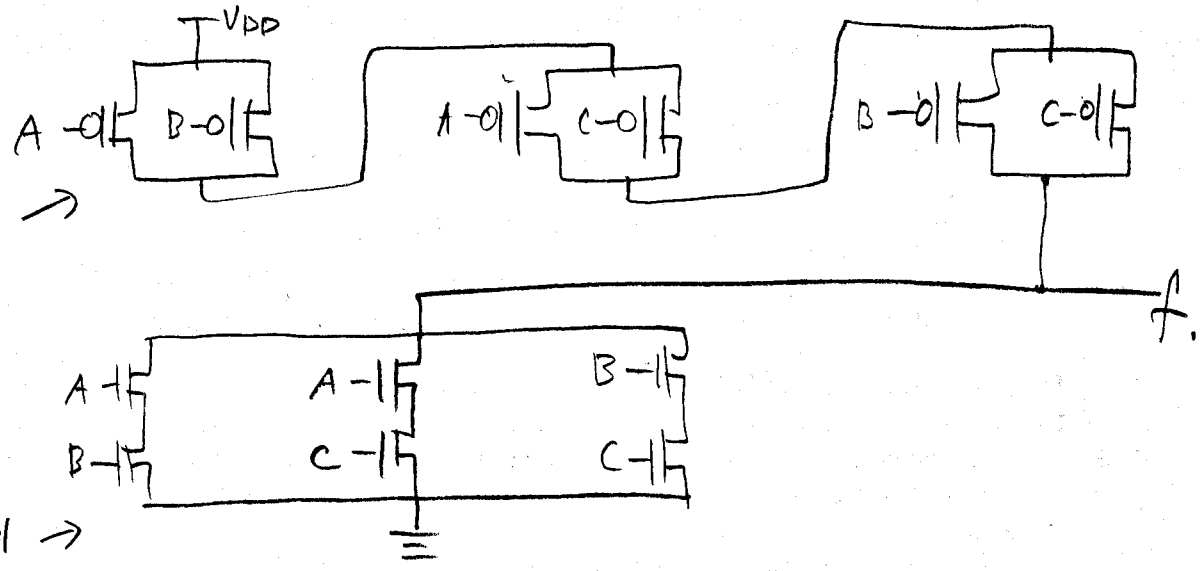
$F = \overline{A \cdot B \cdot C}$

2.



$F = \overline{A + \overline{B}}$

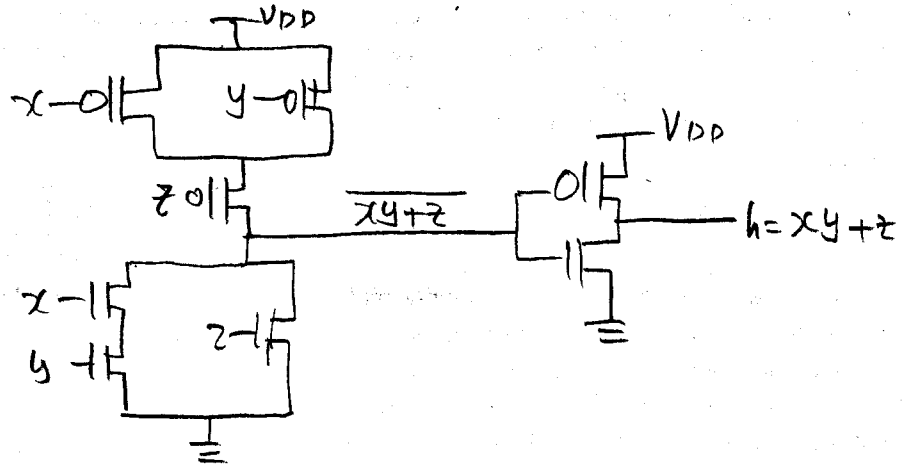
3.



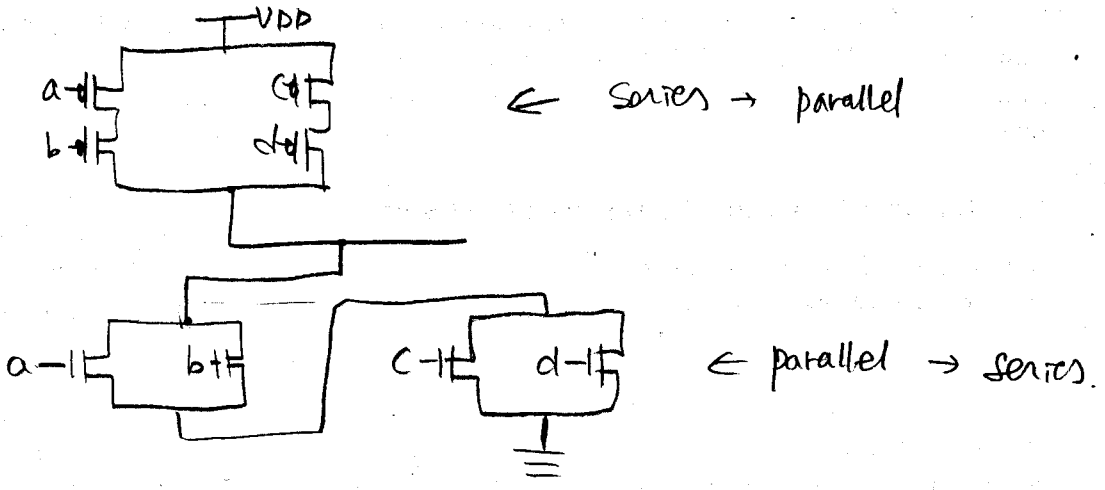
parallel → series →

series → parallel →

4. $h = x \cdot y + z = \overline{\overline{x \cdot y + z}}$ → Invert.) → AOI



5.



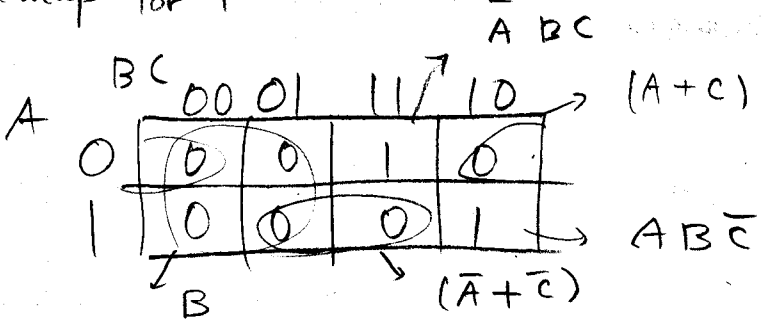
← series → parallel

← parallel → series.

6.

A	BC	F	$\bar{F}$
0	00	1	0
0	01	1	0
0	10	1	0
0	11	0	1
1	00	1	0
1	01	1	0
1	10	0	1
1	11	1	0

K-map for $\bar{F}$



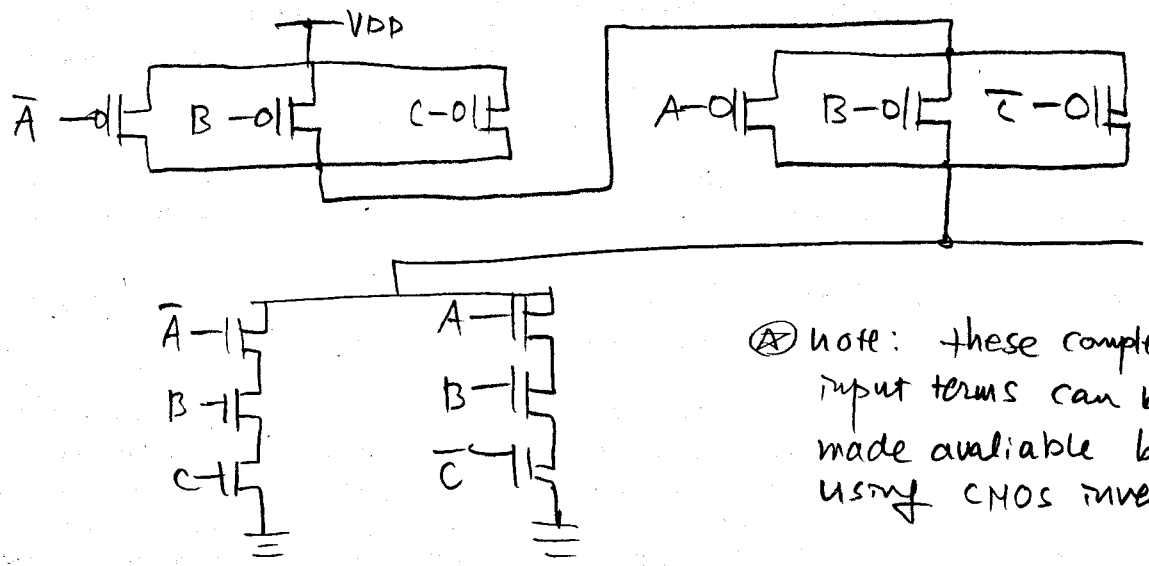
In mSOP, $\bar{F} = \bar{A}BC + AB\bar{C}$

So, in AOI, $F = \overline{\bar{A}BC + AB\bar{C}}$ ... (1)

In mPOS $\bar{F} = (A+C) \cdot B \cdot (\bar{A}+\bar{C})$

So, in OAI, $F = \overline{(A+C) \cdot B \cdot (\bar{A}+\bar{C})}$ ... (2)

CMOS gate for ①.



Ⓐ note: these complementary input terms can be made available by using CMOS inverter.

CMOS gate for : ②