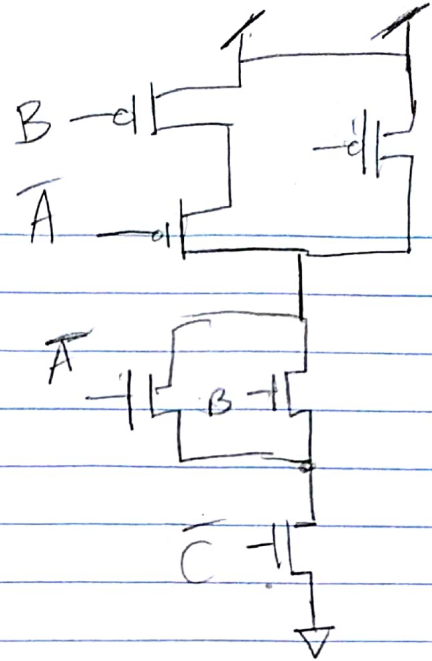


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HW2

3. a)  $O_{ut} = A \cdot \bar{B} + C$   
 $= \overline{\overline{(A \cdot \bar{B}) + C}}$   
 $O_{ut} = \overline{(\bar{A} + B) \cdot \bar{C}}$

nand



b)  $D_X = \overline{\overline{(E + F) \cdot G}}$

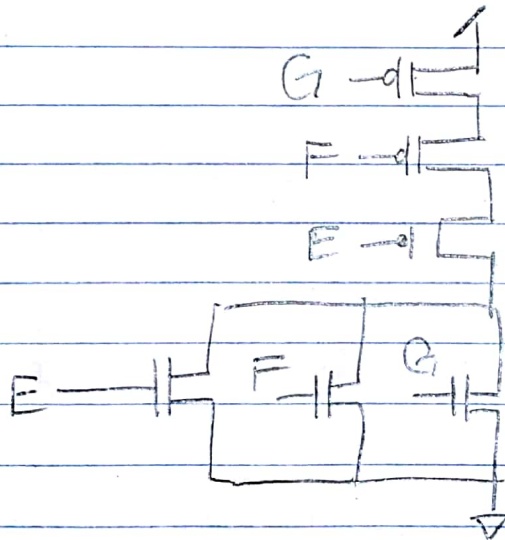
$= \overline{(E + F) + \bar{G}}$   
 $=$

$\overline{(A + B) \cdot C}$

$\overline{(A + B) + C}$

↓ demorgan

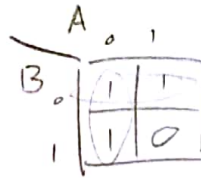
$\overline{(\bar{A} \cdot \bar{B}) + C}$



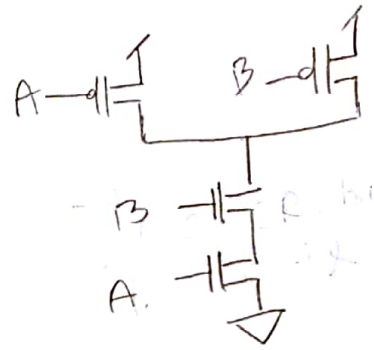
4. a)

NAND

A	B	V <sub>out</sub>
0	0	1
0	1	1
1	0	1
1	1	0



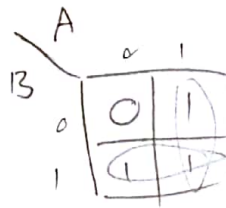
$$\frac{\overline{A+B}}{\overline{A+B}} = \overline{A \cdot B}$$



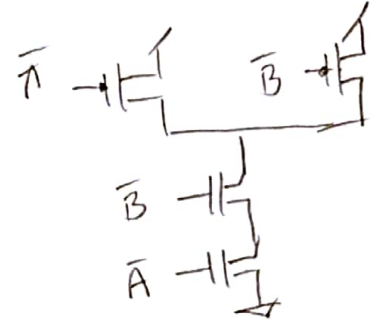
b)

OR

A	B	V <sub>out</sub>
0	0	0
0	1	1
1	0	1
1	1	1



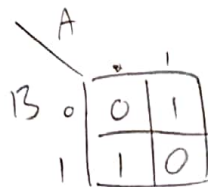
$$\frac{A+B}{A+B} = \overline{\overline{A+B}} = \overline{\overline{A} \cdot \overline{B}}$$



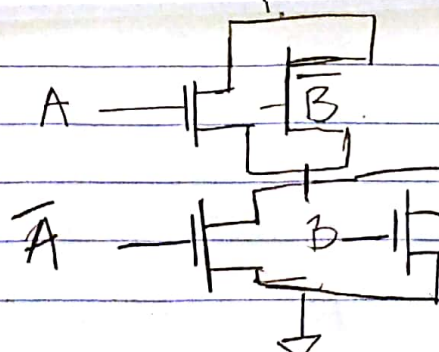
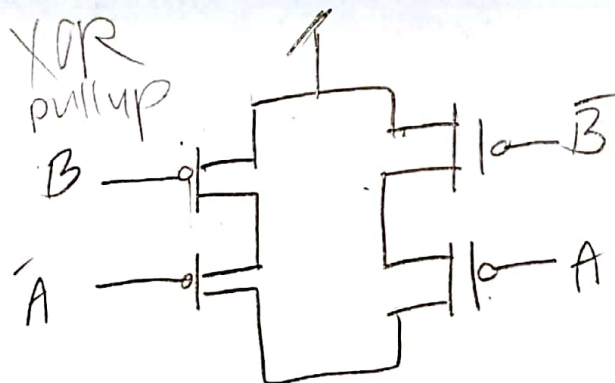
d)

XOR

A	B	V <sub>out</sub>
0	0	0
0	1	1
1	0	1
1	1	0



$$\frac{(A \cdot \overline{B}) + (\overline{A} \cdot B)}{(A \cdot \overline{B}) + (\overline{A} \cdot B)} = \overline{(A \cdot \overline{B}) \cdot (\overline{A} \cdot B)} = \overline{(\overline{A+B}) \cdot (A+B)}$$



XOR pull down

## 5b. Half adder summing circuit

i) Truth Table

Input		Output	
A	B	S	C
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

i)

A	B	Sum
0	0	0
0	1	1
1	0	1
1	1	0

ii)

A \ B	0	1
0	0	1
1	1	0

Like XOR

c) Half adder carry circuit

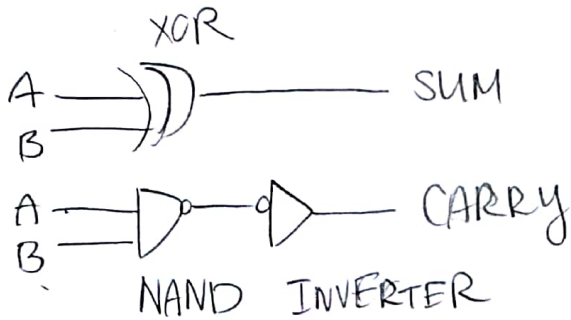
i)

A	B	Carry
0	0	0
0	1	0
1	0	0
1	1	1

ii)

A \ B	0	1
0	0	0
1	0	1

Like AND



## Full adder sum

d)

Input			Output
A	B	Cin	Sum
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

A \ B Cin	00	01	11	10
0	0	1	0	1
1	1	0	1	0

$$S = \bar{A}\bar{B}C_{in} + \bar{A}B\bar{C}_{in} + AB\bar{C}_{in} + ABC_{in}$$