

CPE 100 Digital



2/10/2021 XOR exclusive or Logic 1
Lecture 7

A	B	XOR
0	0	0
0	1	1
1	0	1
1	1	0

Product of sums
 $(A + B) \cdot (\bar{A} + \bar{B}) = \text{XOR}$

Sum of products

$$\bar{A} \cdot B + A \cdot \bar{B} = \text{XOR}$$

$$\overline{(A+B) \cdot (\bar{A} + \bar{B})} = \overline{\text{XOR}}$$

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

$$\bar{A} \cdot \bar{B} + A \cdot B =$$

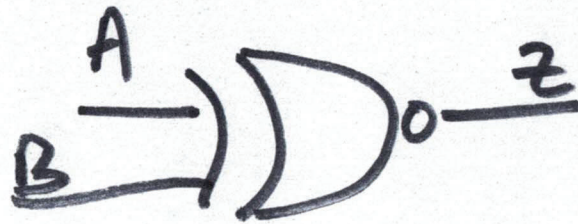
$$\bar{A} \cdot B + A \cdot \bar{B}$$

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

$$(A + \bar{B})(\bar{A} + B) = \overline{\text{XOR}}$$

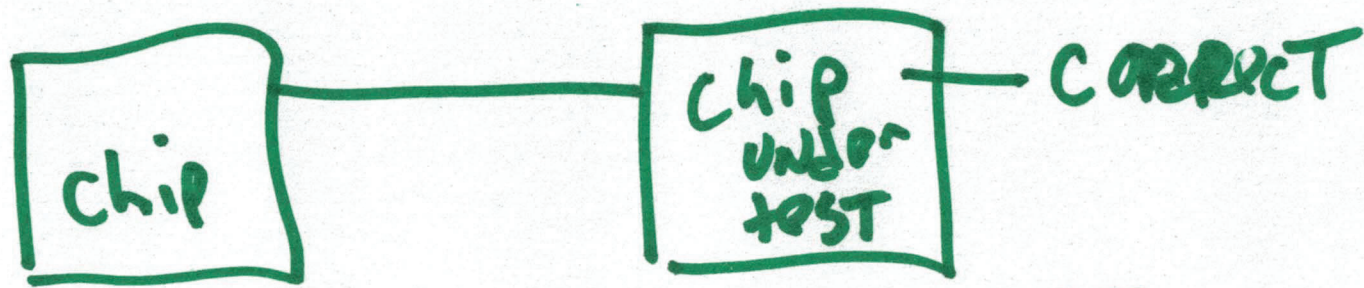
2)

XNOR

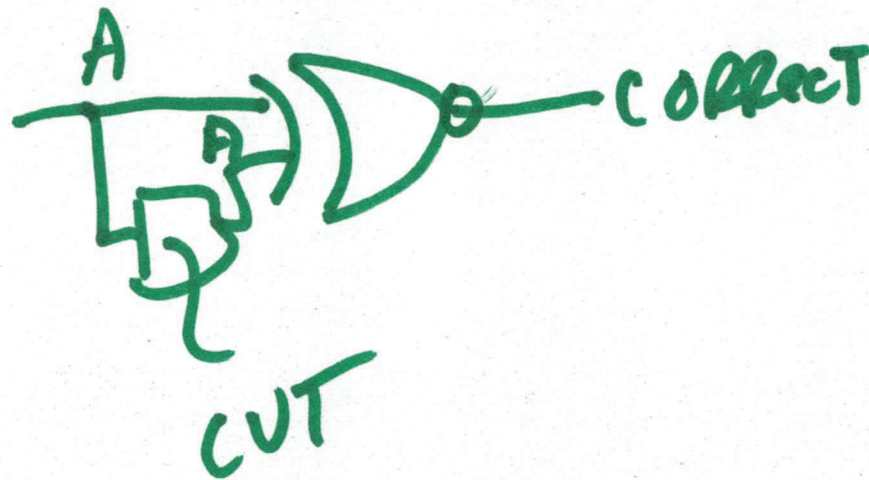


A	B	XNOR
0	0	1
0	1	0
1	0	0
1	1	1

3)

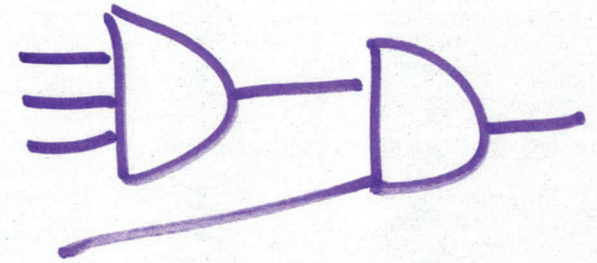
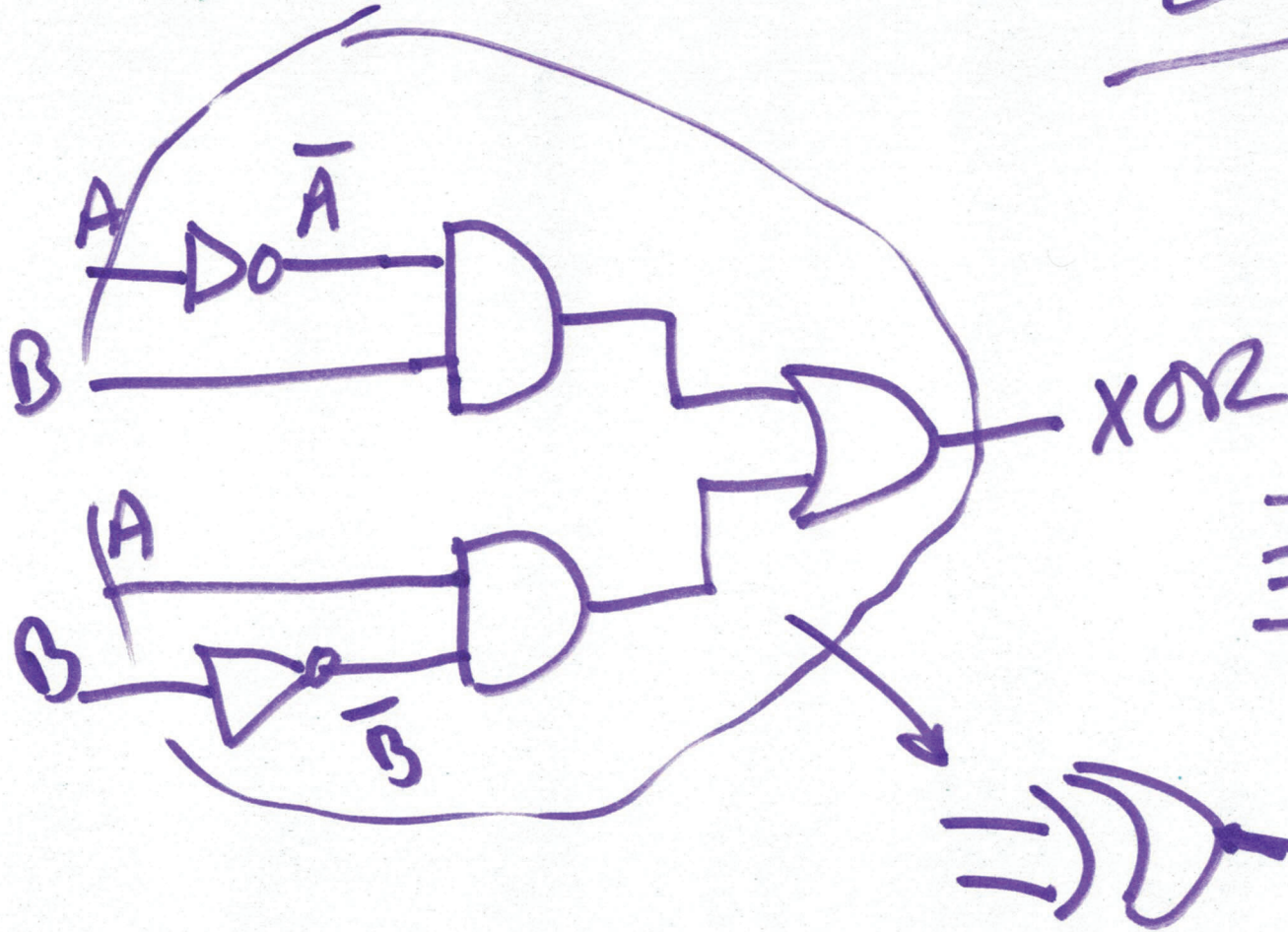


← CUT



XOR

$$\bar{A} \cdot B + A \cdot \bar{B}$$



5)

$$A + 1 = 1$$

$$A + 0 = A$$

$$A \cdot 1 = A$$

$$A \cdot 0 = 0$$

$$A \cdot B = B \cdot A$$

$$A + B = B + A$$

$$A(B + C) = AB + AC$$

$$(A + B) \cdot (C + D) = A(C + D) + B(C + D) \\ AC + AD + BC + BD$$



$$Z = A \cdot (B + C + 0 + 1)$$

$$Z = A \cdot 1 \cdot 1$$

$$Z = A$$

$$z = A + B\bar{A} \rightarrow A + B$$

A	B	z
0	0	0
0	1	1
1	0	1
1	1	1

$$\begin{aligned} z &= ABC\bar{B} = 0 \\ &= ACB\bar{B} = 0 \end{aligned}$$

$$B\bar{B} = 0$$

$$Z = ABC\bar{D} + A\overline{BCD} + \overline{(A+B+C+D)}$$

$$\text{YES?} = A(BC\bar{D} + \overline{BCD}) + \overline{(A+B+C+D)}$$

$$A + \bar{A}B = A + B$$

$$\text{NO} = (ABC + A\bar{B}C)\bar{D} + \overline{(A+B+C+D)}$$

$$Z = ABC\bar{D} + A\overline{BCD} + \bar{A}\bar{B}\bar{C}\bar{D}$$

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

A	B	C	D	Z
0	0	0	0	1
0	0	0	1	0
0	0	1	0	0
0	0	1	1	0
0	1	0	0	0
0	1	0	1	0
0	1	1	0	0
0	1	1	1	0
1	0	0	0	1
1	0	0	1	1
1	0	1	0	1
1	0	1	1	1
1	1	0	0	1
1	1	0	1	1
1	1	1	0	1
1	1	1	1	0

9)