Logic Design

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1- Analog:

2- Digital "Binary"

3- Basic Gates:

1- and

$Z = X \cdot Y$

X	Y	Z
0	1	0
1	1	1
0	0	0

* num of combination values = 2^n ⇒ n variables

2- OR

$Z = X + Y$

X	Y	Z
0	0	0
0	1	1
1	1	1

3- NOT $X \rightarrow \bar{X}$ complement

X	$\bar{X}$
0	1
1	0

4- NAND ; AND ⇒ Not

X	Y	Z
0	0	1
1	0	1
1	1	0

5- NOR ; OR ⇒ Not

X	Y	Z
0	1	0
1	1	0
0	0	1

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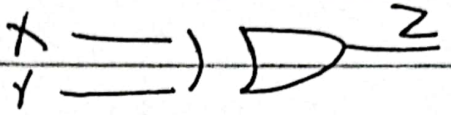
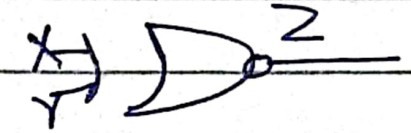
6- X or Y : - متشابهين (0) مختلفين (1)
"exclusives"

X	Y	Z
0	1	1
0	0	0
1	1	0



7- X NOR: (0) مختلفين (1) متشابهين — X OR → Not



X	Y	Z
0	1	0
0	0	1
1	1	1

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Ones and Twos Complement

1. Signed Magnitude:

Most Bit (MSB) : 1 → Negative num.
: 0 → Postive num.

2. ones complement:

الرقم الموجب كما هو

Ex: $23 = (00010111)_2 \rightarrow (00010111)_{C1}$
$-9 = -(00001001)_2 \rightarrow (11110110)_{C2}$

3. Twos complement:

الموجب كما هو.

السالب: ones(1) + 1 ⇐

Ex: $-9 = -(0000\,1001)_2 = 1111\,0110_{C1} + 1 =$

$1111\,0111)_{C2}$