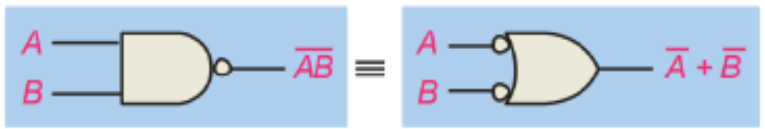
Explain Demorgan's theorem.

Demorgan's first law:

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

Inputs		Output	
A	B	$\overline{AB}$	$\overline{A} + \overline{B}$
0	0	1	1
0	1	1	1
1	0	1	1
1	1	0	0



NAND Negative-OR

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

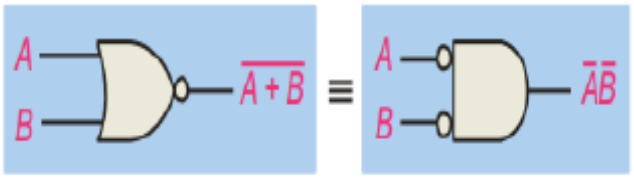
A	B	A • B	$\overline{A \bullet B}$		$\overline{A}$	$\overline{B}$	$\overline{A} + \overline{B}$
0	0	0	1		1	1	1
0	1	0	1		1	0	1
1	0	0	1		0	1	1
1	1	1	0		0	0	0

EQUAL

Demogan's Second law:

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

Inputs		Output	
A	B	$\overline{A+B}$	$\overline{A}\,\overline{B}$
0	0	1	1
0	1	0	0
1	0	0	0
1	1	0	0



NOR Negative-AND

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

A	B	A + B	$\overline{A+B}$		$\overline{A}$	$\overline{B}$	$\overline{A} \times \overline{B}$
0	0	0	1		1	1	1
0	1	1	0		1	0	0
1	0	1	0		0	1	0
1	1	1	0		0	0	0

EQUAL