

Les fonctions logiques

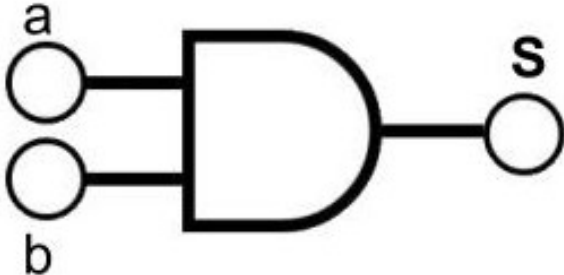
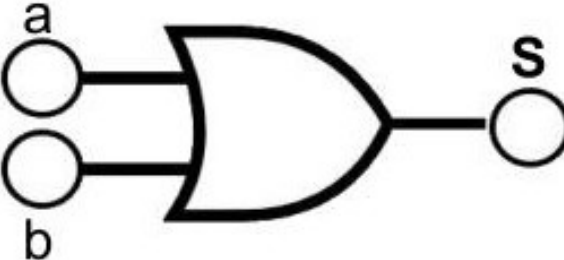
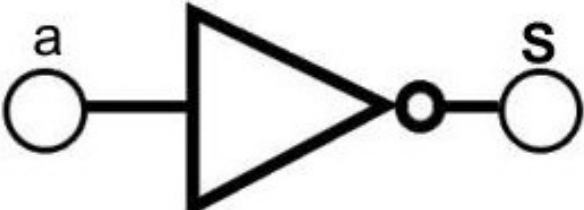
Partie 2

NAND, NOR

C'est parti !

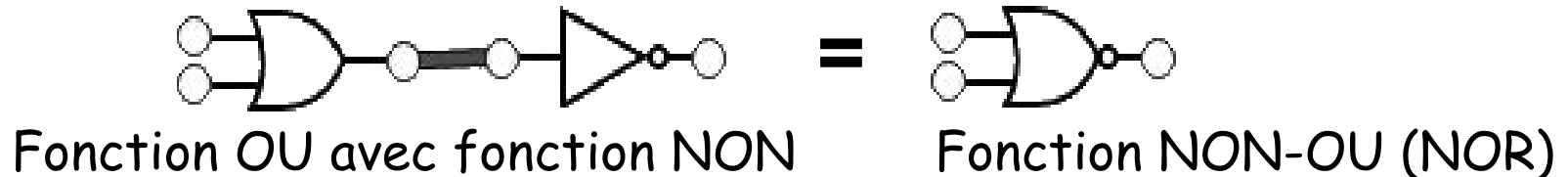
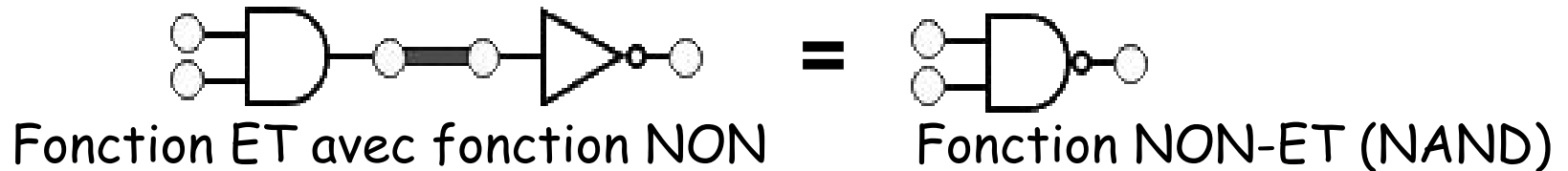


Rappel sur les fonctions logiques ET OU NON

Type	Symbole américain	Opération S	Table de vérité															
ET = AND		$S =$ $a \cdot b$ (Se lit $S = a$ et b)	<table border="1"> <thead> <tr> <th>a</th> <th>b</th> <th>S</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>0</td> <td>1</td> <td>0</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> </tr> </tbody> </table>	a	b	S	0	0	0	0	1	0	1	0	0	1	1	1
a	b	S																
0	0	0																
0	1	0																
1	0	0																
1	1	1																
OU = OR		$S =$ $a + b$ (Se lit $S = a$ ou b)	<table border="1"> <thead> <tr> <th>a</th> <th>b</th> <th>S</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>0</td> <td>1</td> <td>1</td> </tr> <tr> <td>1</td> <td>0</td> <td>1</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> </tr> </tbody> </table>	a	b	S	0	0	0	0	1	1	1	0	1	1	1	1
a	b	S																
0	0	0																
0	1	1																
1	0	1																
1	1	1																
NON = NOT		$S =$ \bar{a} (Se lit $S = a$ barre)	<table border="1"> <thead> <tr> <th>a</th> <th>S</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>1</td> </tr> <tr> <td>1</td> <td>0</td> </tr> </tbody> </table>	a	S	0	1	1	0									
a	S																	
0	1																	
1	0																	

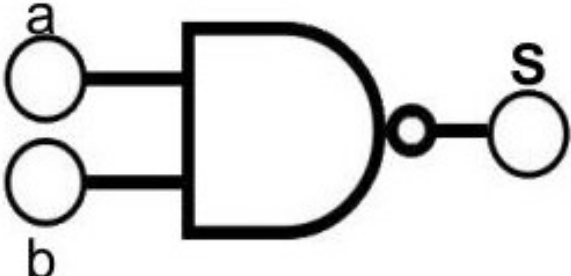
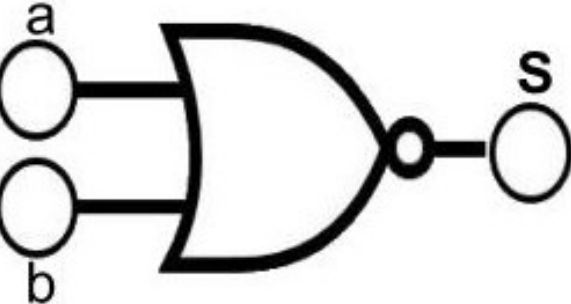
Les fonctions logiques NON-ET NON-OU

Les fonctions logiques NON-ET, NON-OU sont un assemblage de fonctions (ET ou OU) avec un fonction NON.



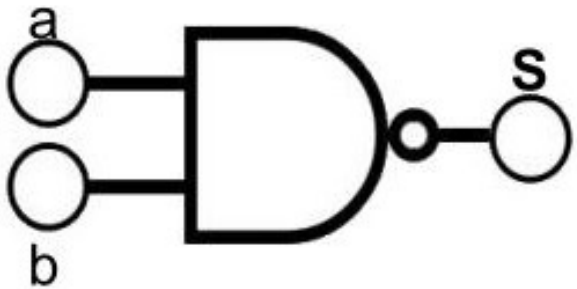
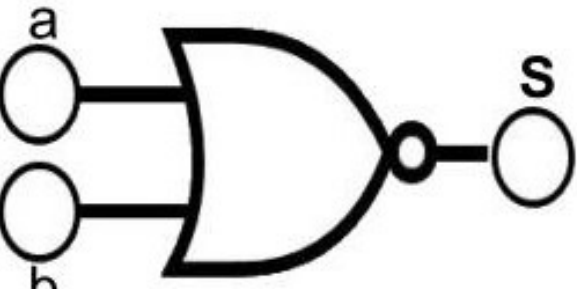
Ces fonctions sont universelles car elle permettent de reconstituer toutes les autres fonctions logiques.

Les fonctions logiques NON-ET (NAND) NON-OU (NOR)

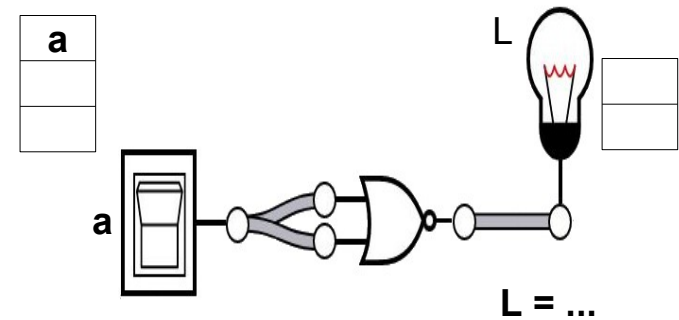
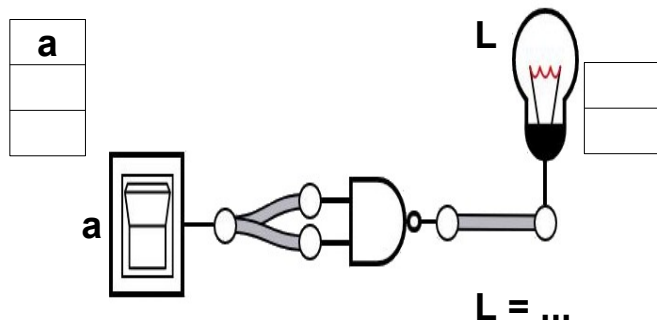
Type	Symbole américain	Opération S	Table de vérité															
NON ET =NAND		S = (Se lit $S = a \text{ et } b \text{ barre}$)	<table border="1"> <thead> <tr> <th>a</th> <th>b</th> <th>S</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>...</td> </tr> <tr> <td>0</td> <td>1</td> <td>...</td> </tr> <tr> <td>1</td> <td>0</td> <td>...</td> </tr> <tr> <td>1</td> <td>1</td> <td>...</td> </tr> </tbody> </table>	a	b	S	0	0	...	0	1	...	1	0	...	1	1	...
a	b	S																
0	0	...																
0	1	...																
1	0	...																
1	1	...																
NON OU = NOR		S = (Se lit $S = a \text{ ou } b \text{ barre}$)	<table border="1"> <thead> <tr> <th>a</th> <th>b</th> <th>S</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>...</td> </tr> <tr> <td>0</td> <td>1</td> <td>...</td> </tr> <tr> <td>1</td> <td>0</td> <td>...</td> </tr> <tr> <td>1</td> <td>1</td> <td>...</td> </tr> </tbody> </table>	a	b	S	0	0	...	0	1	...	1	0	...	1	1	...
a	b	S																
0	0	...																
0	1	...																
1	0	...																
1	1	...																

En utilisant <https://logic.ly/demo/> compléter les tableaux logiques.

Les fonctions logiques NON-ET (NAND) NON-OU(NOR)

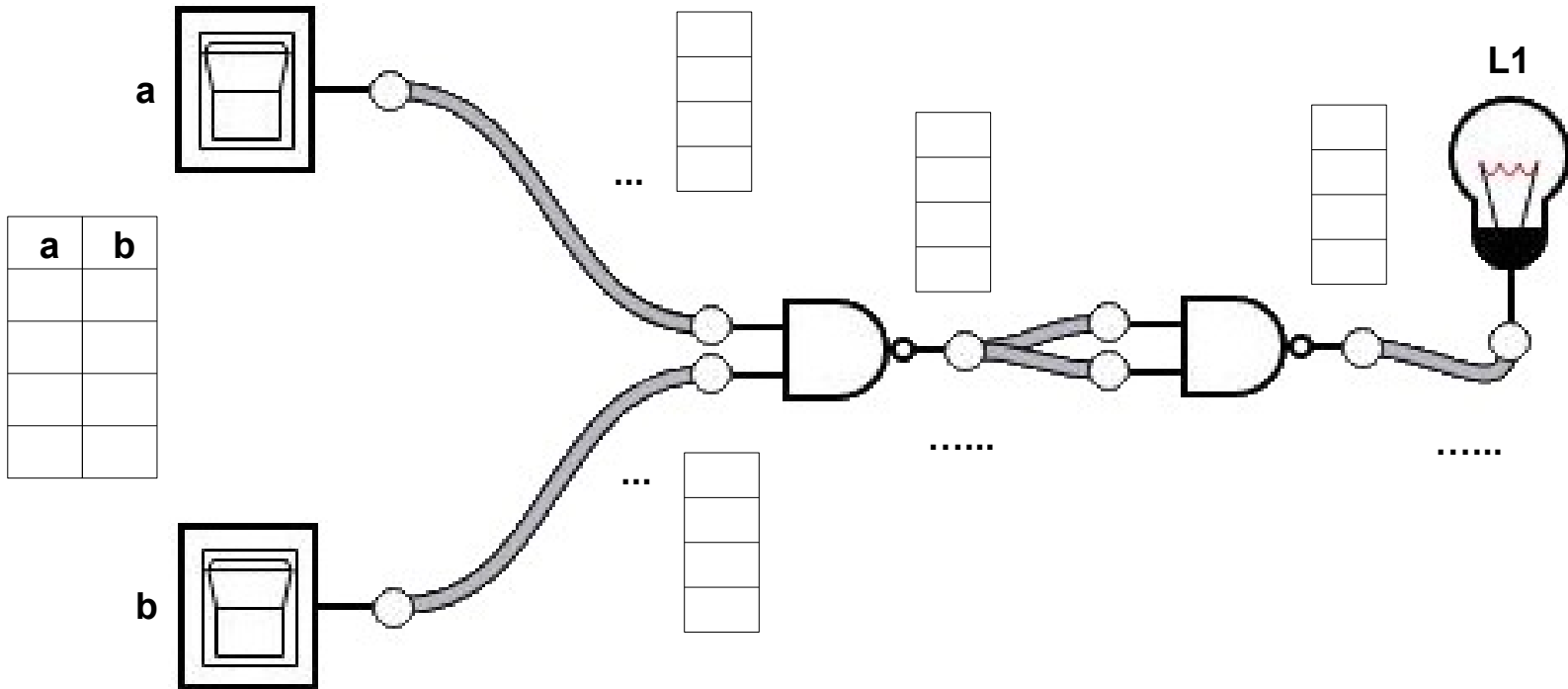
Type	Symbole américain	Opération S	Table de vérité															
NON ET =NAND		$S =$ $\overline{a \cdot b}$ (Se lit S = a et b barre)	<table border="1"> <thead> <tr> <th>a</th> <th>b</th> <th>S</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>1</td> </tr> <tr> <td>0</td> <td>1</td> <td>1</td> </tr> <tr> <td>1</td> <td>0</td> <td>1</td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> </tr> </tbody> </table>	a	b	S	0	0	1	0	1	1	1	0	1	1	1	0
a	b	S																
0	0	1																
0	1	1																
1	0	1																
1	1	0																
NON OU = NOR		$S =$ $\overline{a + b}$ (Se lit S = a ou b barre)	<table border="1"> <thead> <tr> <th>a</th> <th>b</th> <th>S</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>1</td> </tr> <tr> <td>0</td> <td>1</td> <td>0</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> </tr> </tbody> </table>	a	b	S	0	0	1	0	1	0	1	0	0	1	1	0
a	b	S																
0	0	1																
0	1	0																
1	0	0																
1	1	0																

Les fonctions logiques NON-ET (NAND) NON-OU(NOR)



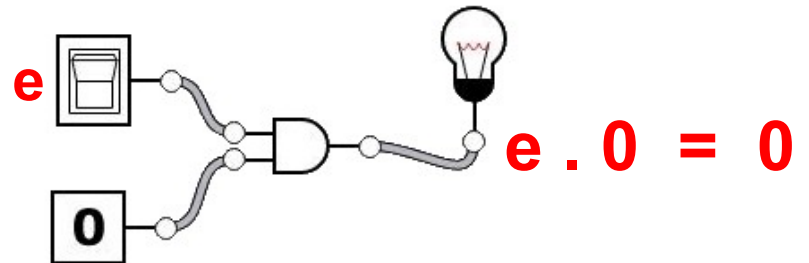
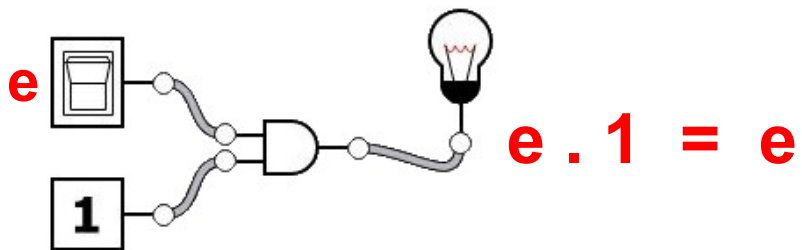
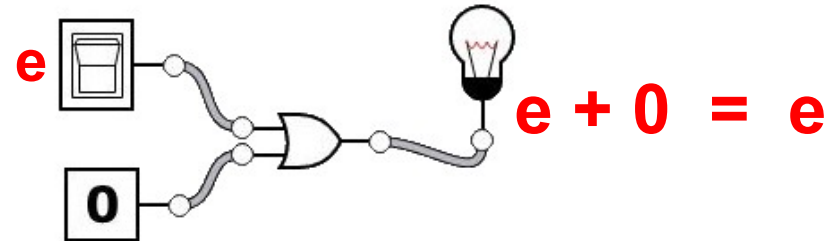
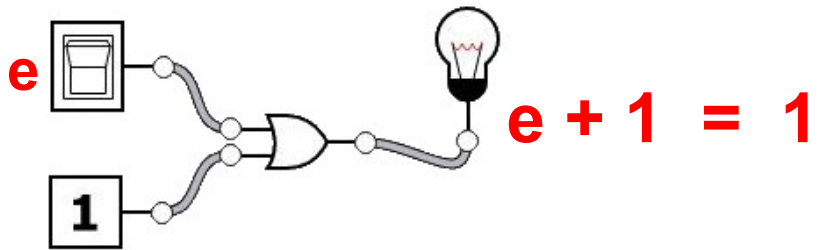
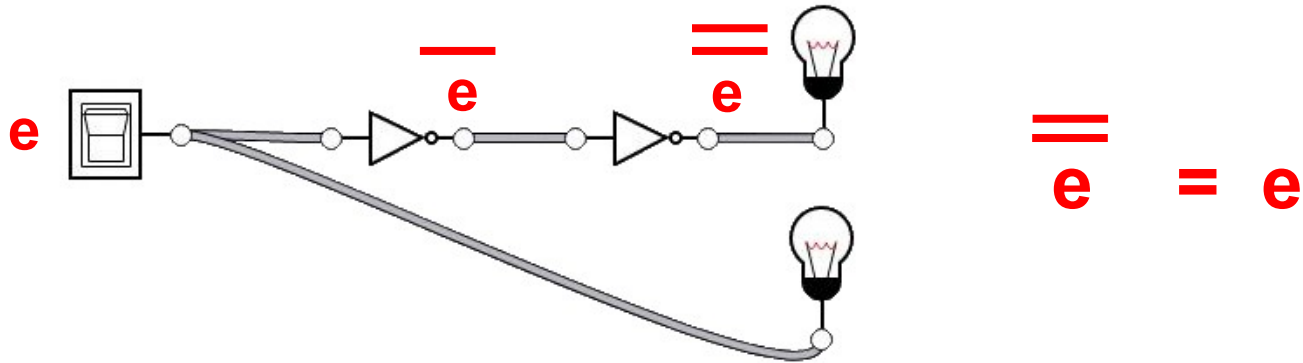
En reliant les entrées, ces fonctions permettent de réaliser la fonction

Des fonctions logiques universelles

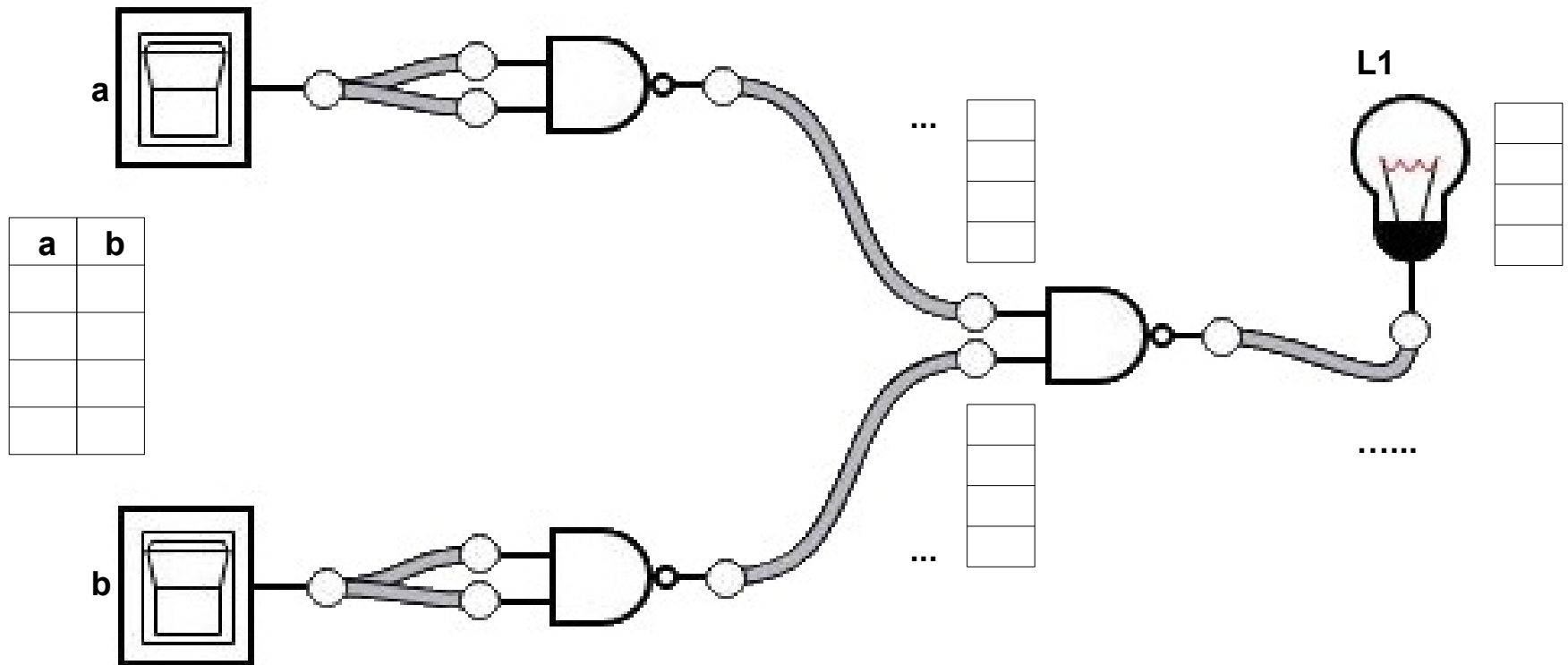


Cet assemblage de NON-ET permet d'obtenir la fonction donc **L1** =

Identités remarquables



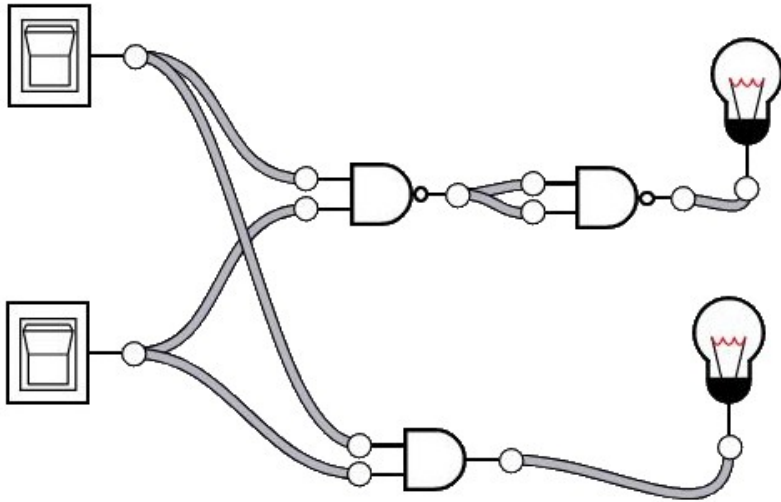
Des fonctions logiques universelles



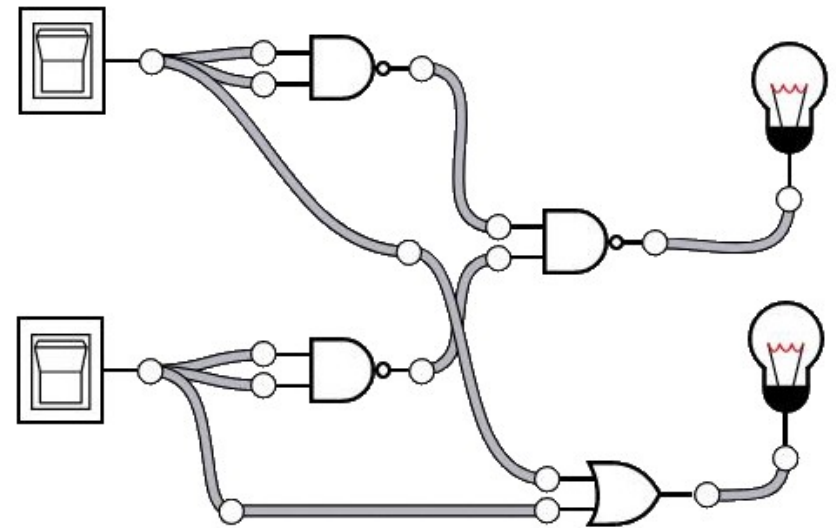
Cet assemblage de NON-ET permet d'obtenir la fonction donc **L1** =

Des fonctions logiques universelles

Les fonctions NON-ET et NON-OU sont universelles car elle permettent de reconstituer toutes les autres fonctions logiques.

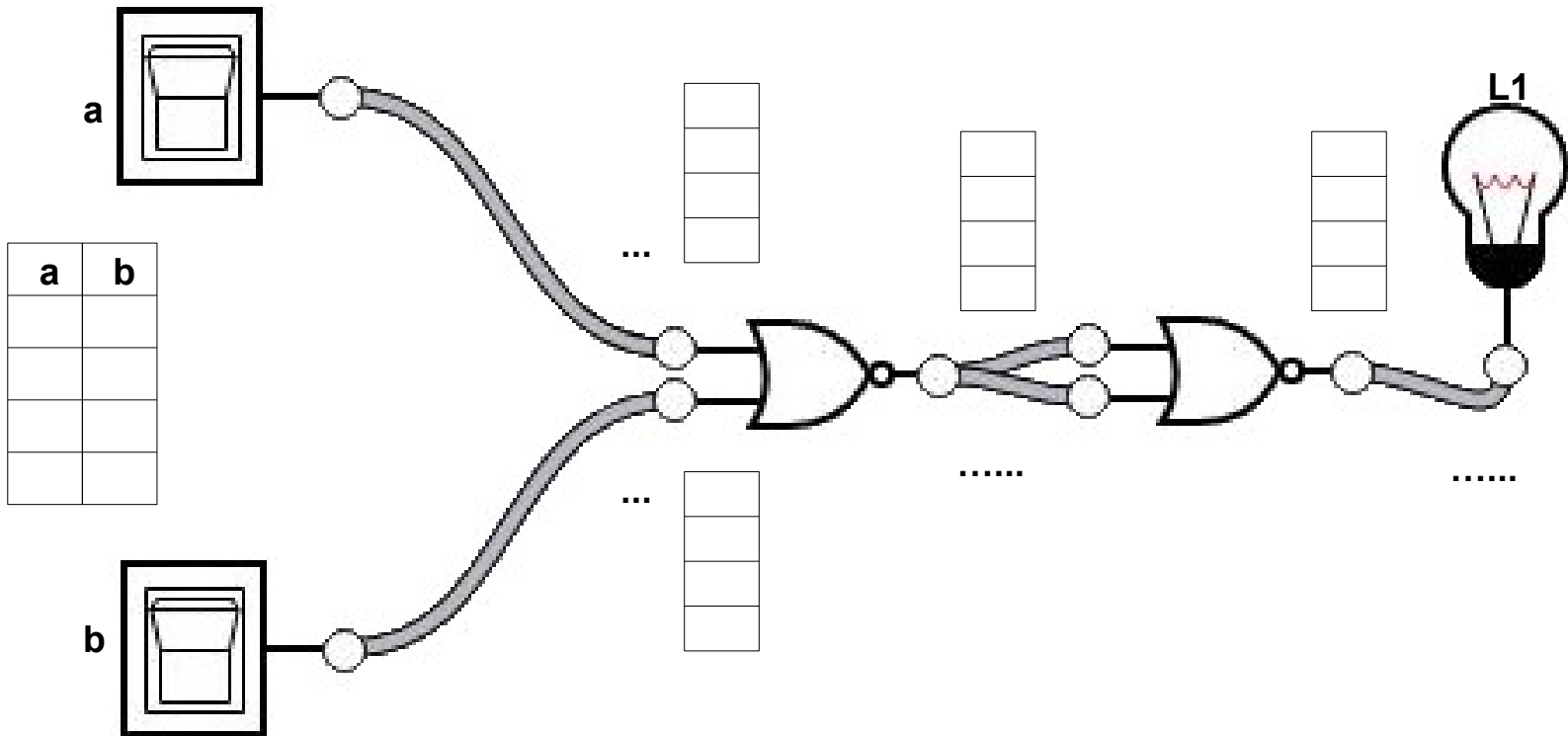


Fonction ET
avec des portes NON-ET



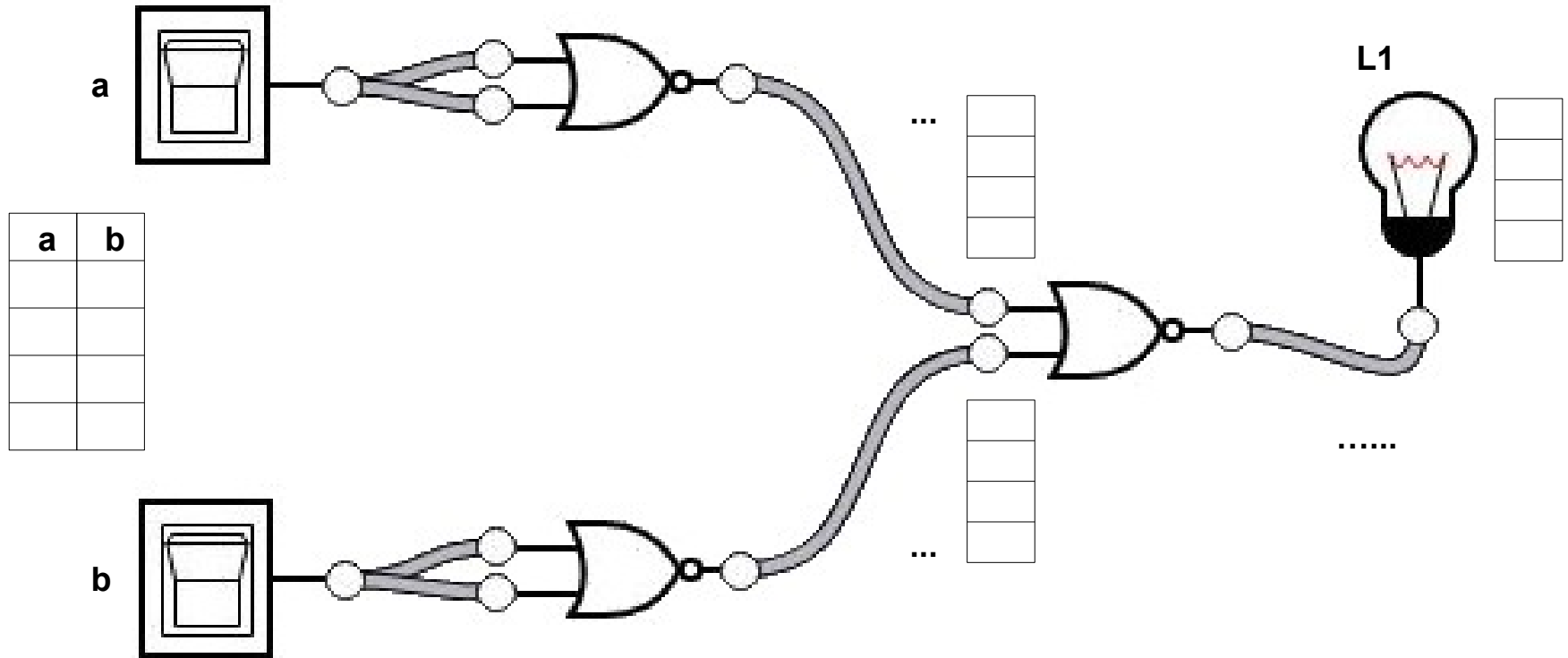
Fonction OU
avec des portes NON-ET

Des fonctions logiques universelles



Cet assemblage de NON-OU permet d'obtenir la fonction donc **L1** =

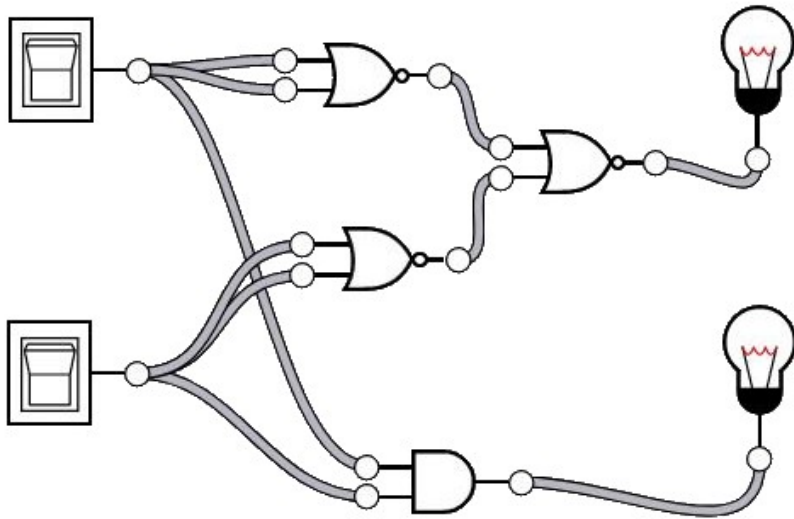
Des fonctions logiques universelles



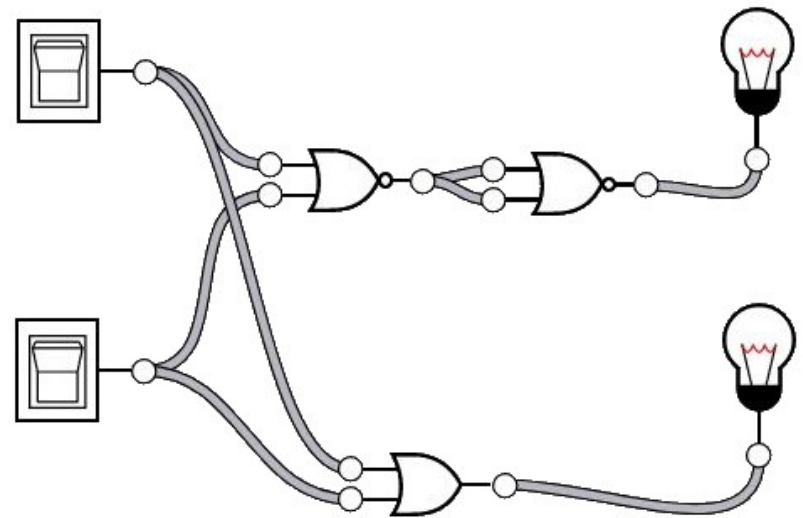
Cet assemblage de NON-OU permet d'obtenir la fonction donc **L1** =

Des fonctions logiques universelles

Les fonctions NON-ET et NON-OU sont universelles car elle permettent de reconstituer toutes les autres fonctions logiques.



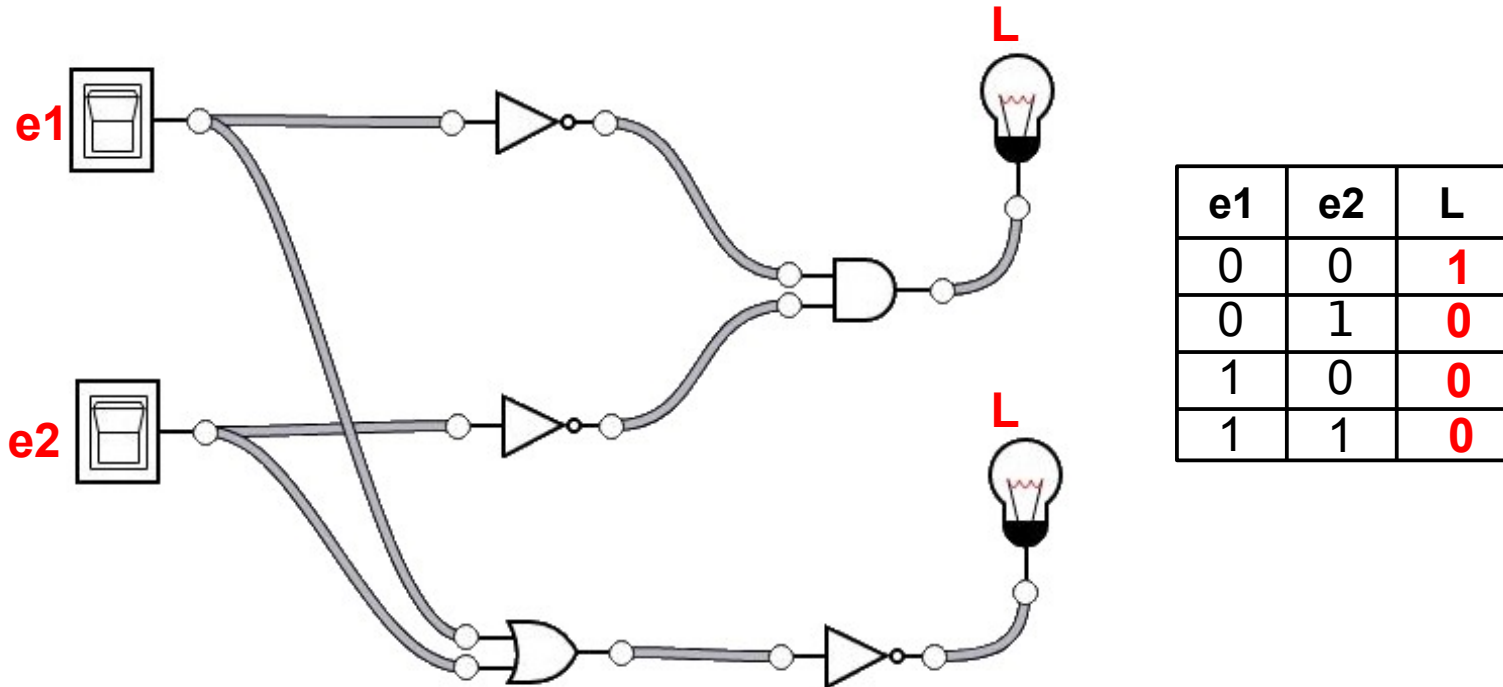
Fonction ET
avec des portes NON-OU



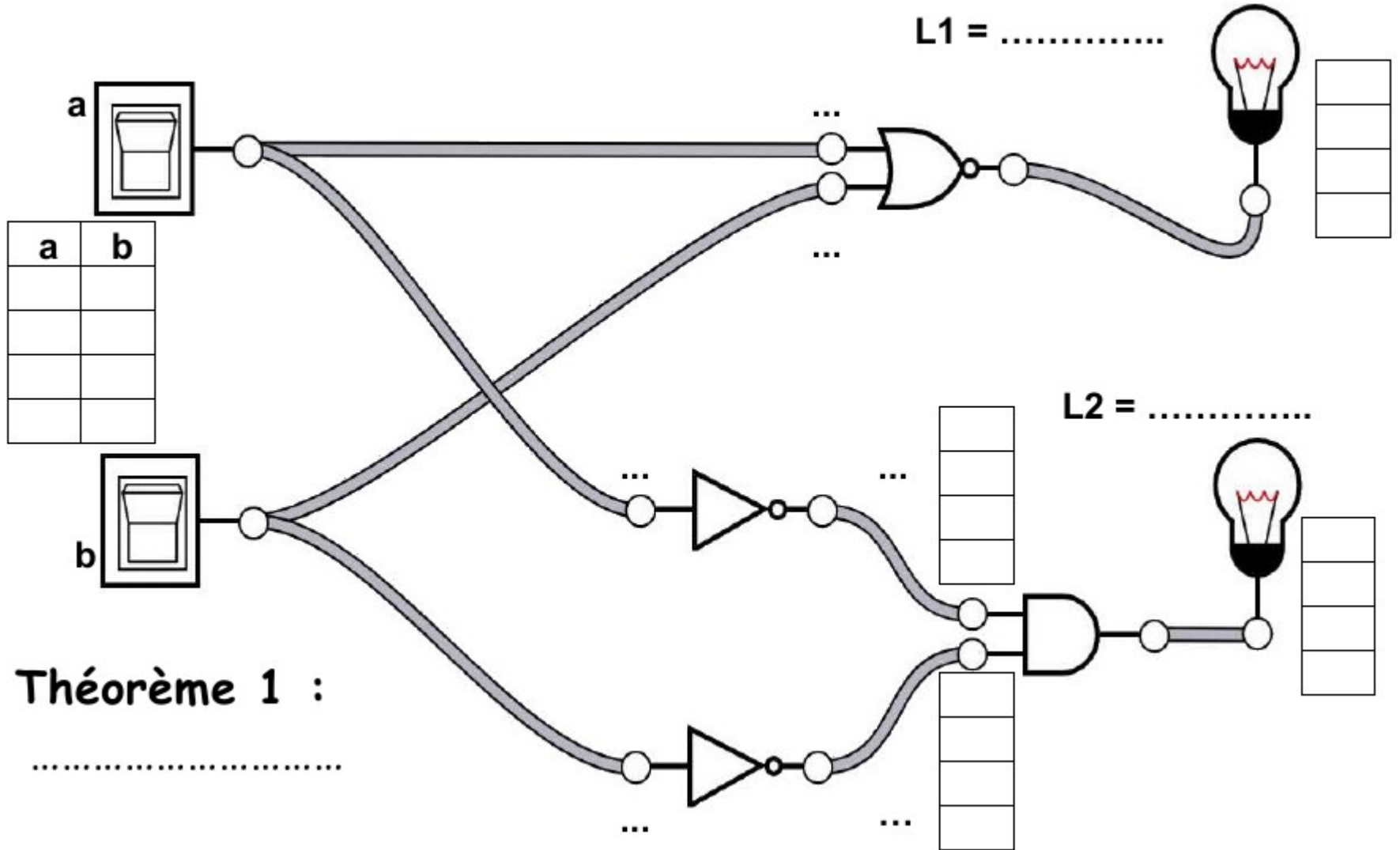
Fonction OU
avec des portes NON-OU

Théorèmes de DEMORGAN

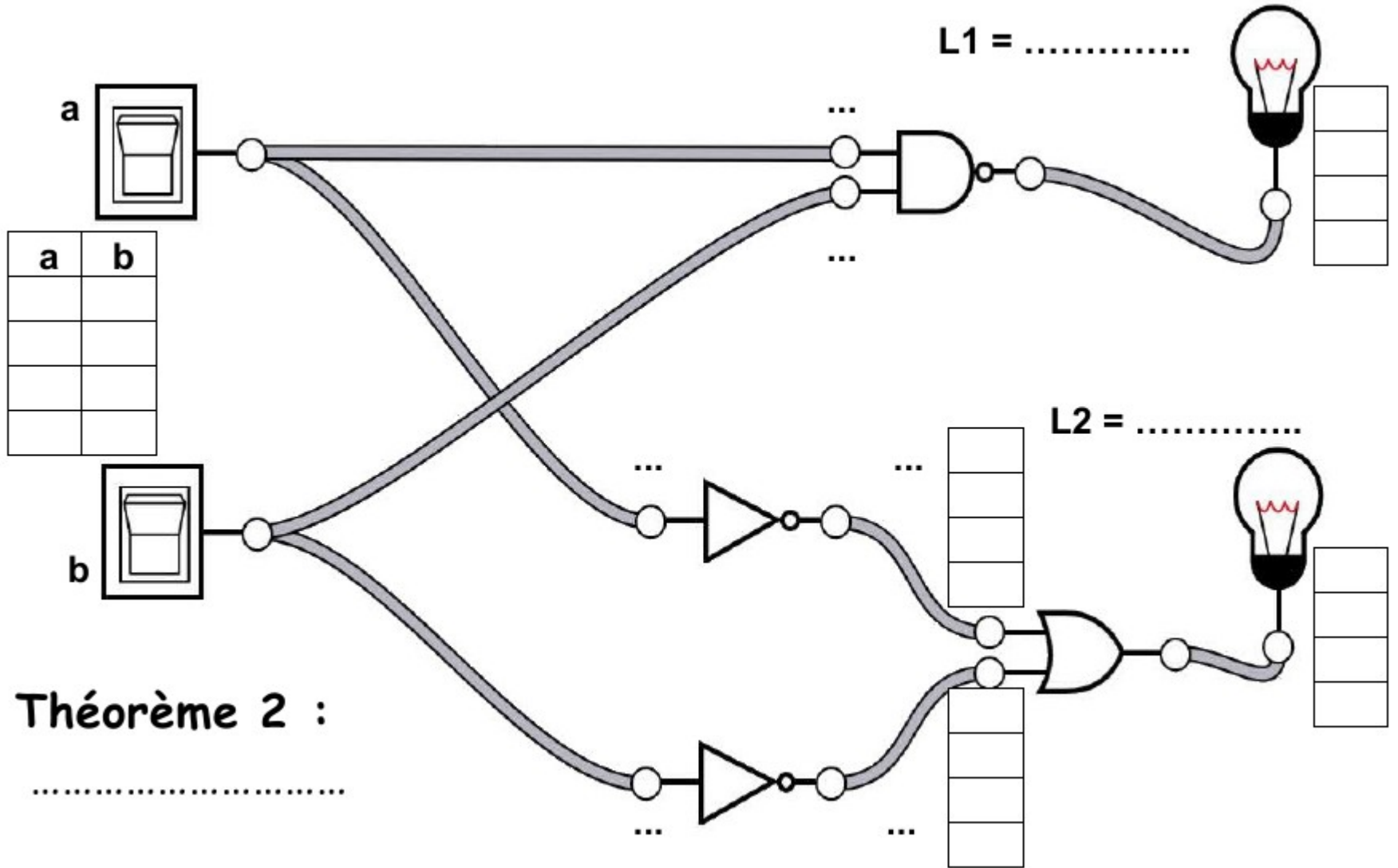
Les théorèmes de DEMORGAN permettent de passer d'une fonction logique ET à une fonction logique OU et inversement



Théorèmes de DEMORGAN

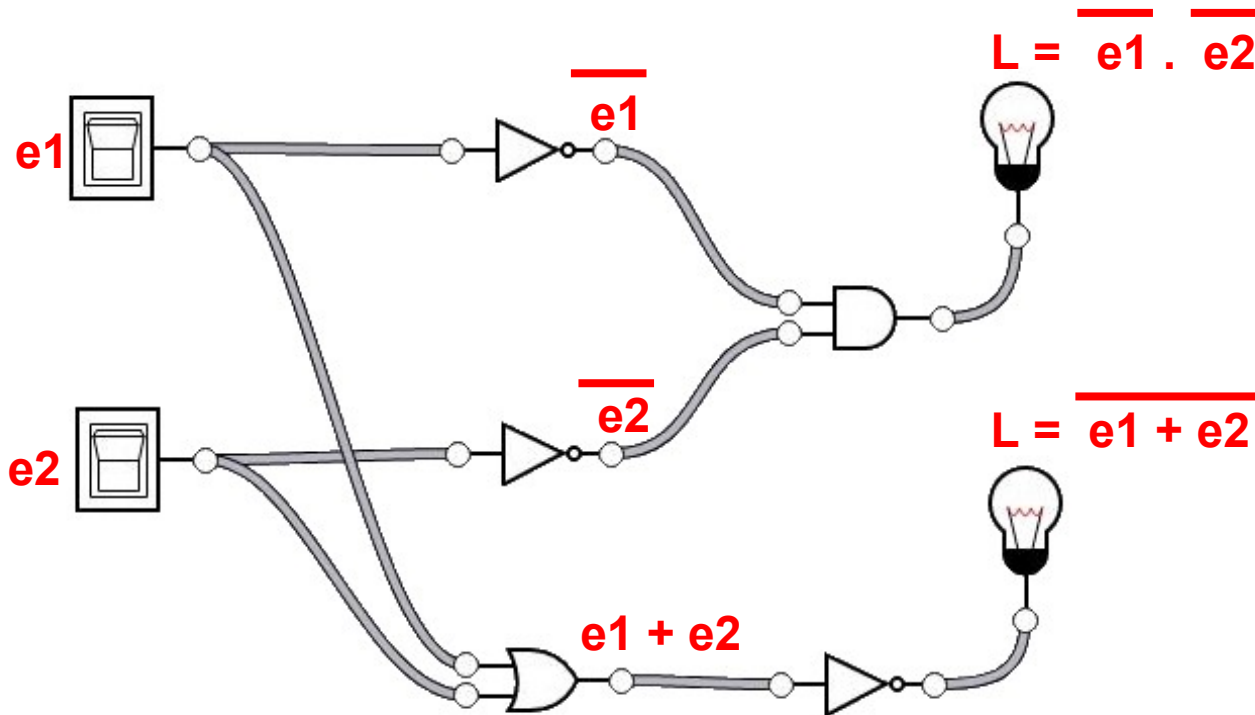


Théorèmes de DEMORGAN



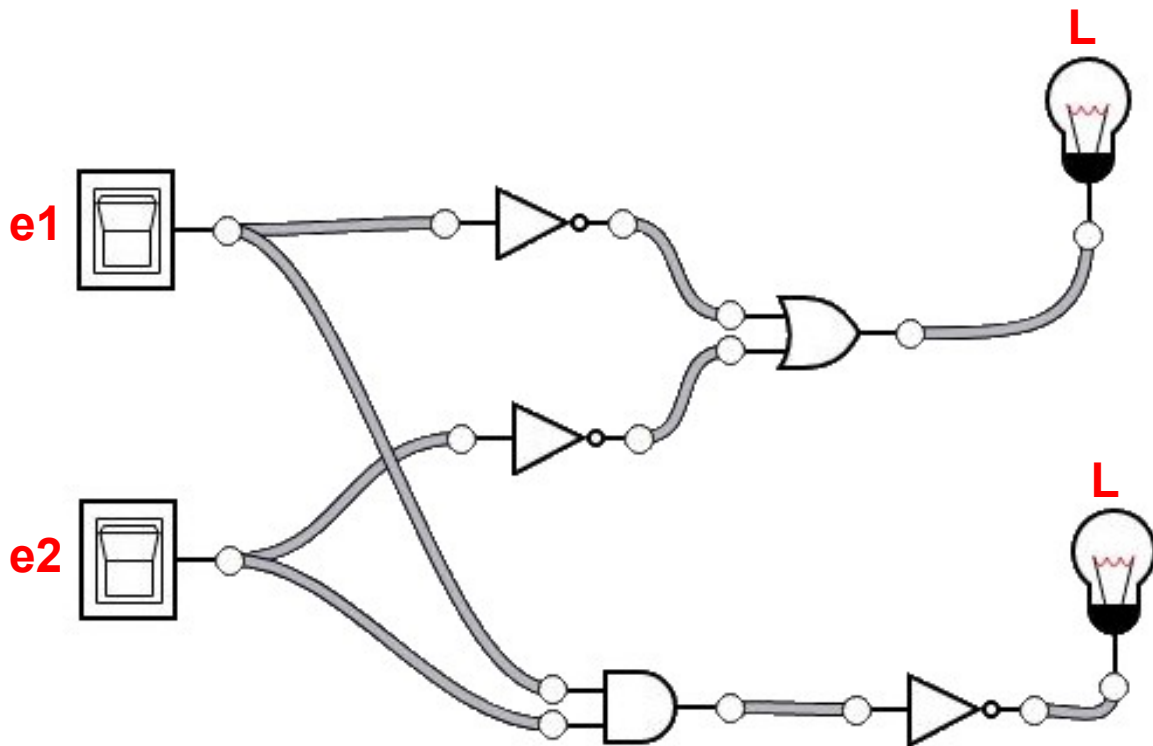
Théorèmes de DEMORGAN

Les théorèmes de DEMORGAN permettent de passer d'une fonction logique ET à une fonction logique OU et inversement



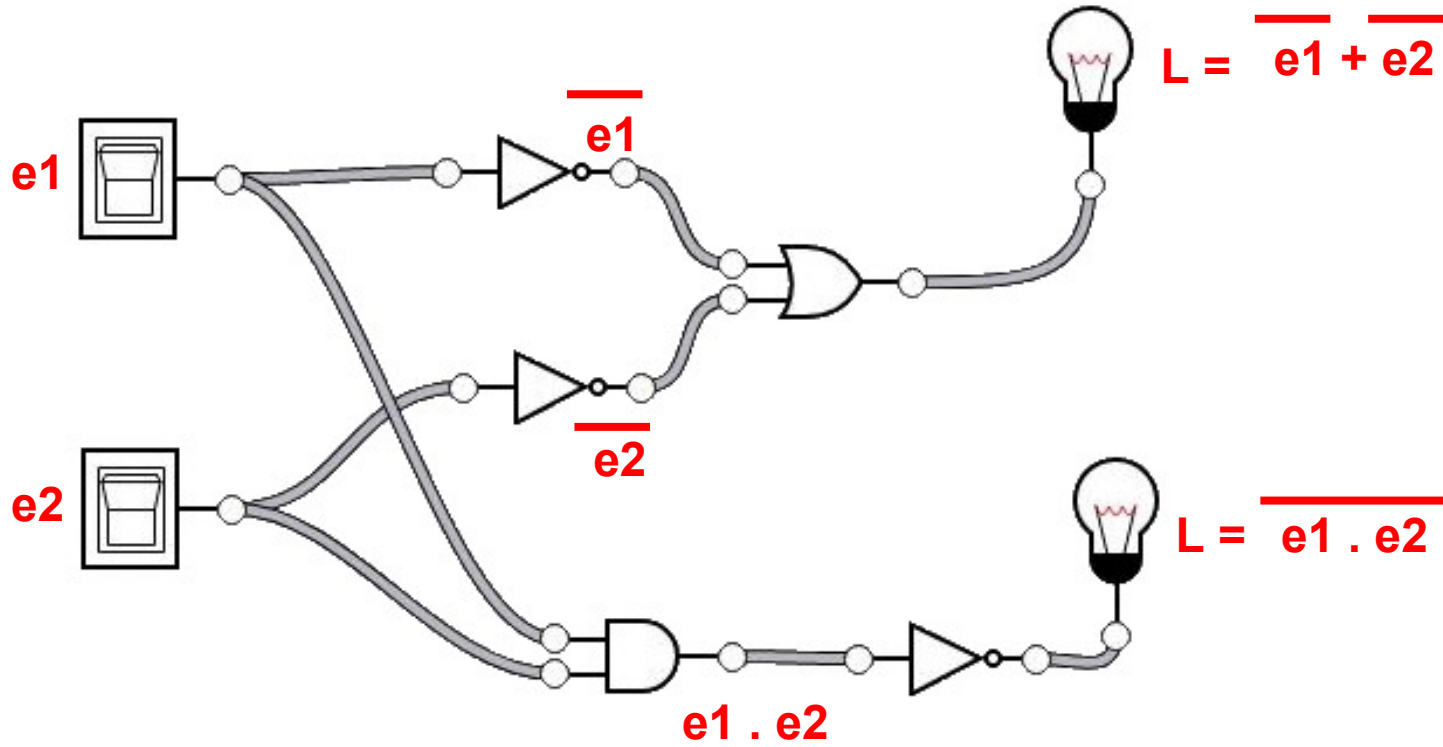
$$\overline{e1 . e2} = \overline{e1 + e2}$$

Théorèmes de DEMORGAN



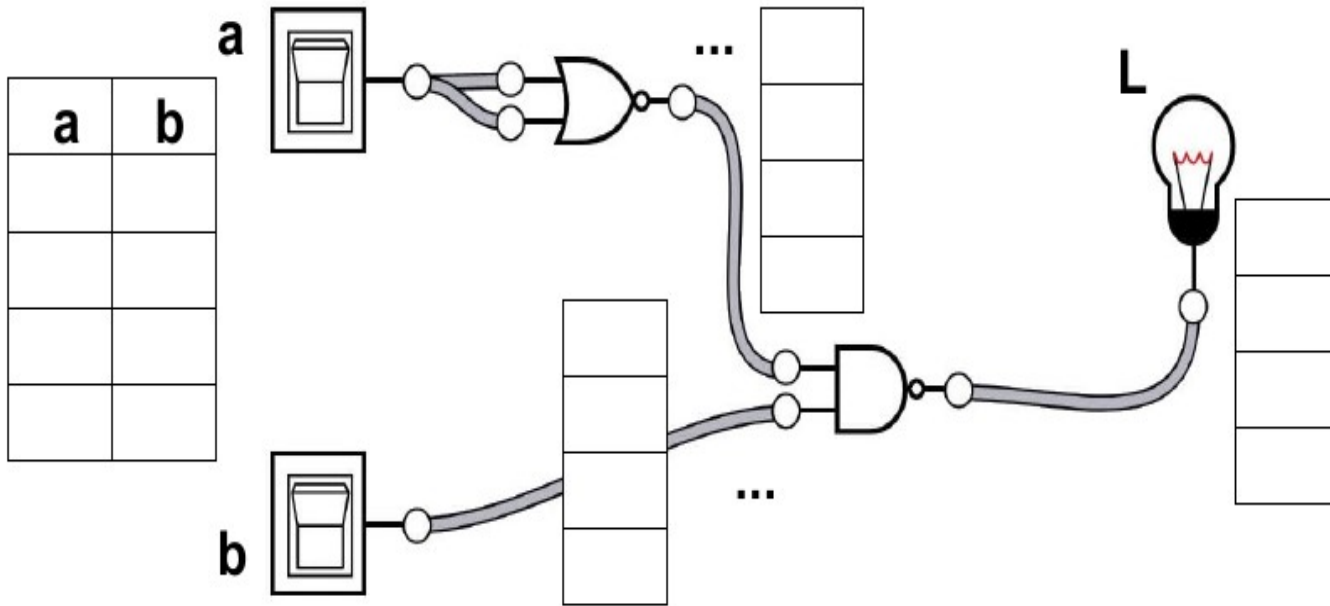
e1	e2	L
0	0	1
0	1	1
1	0	1
1	1	0

Théorèmes de DEMORGAN



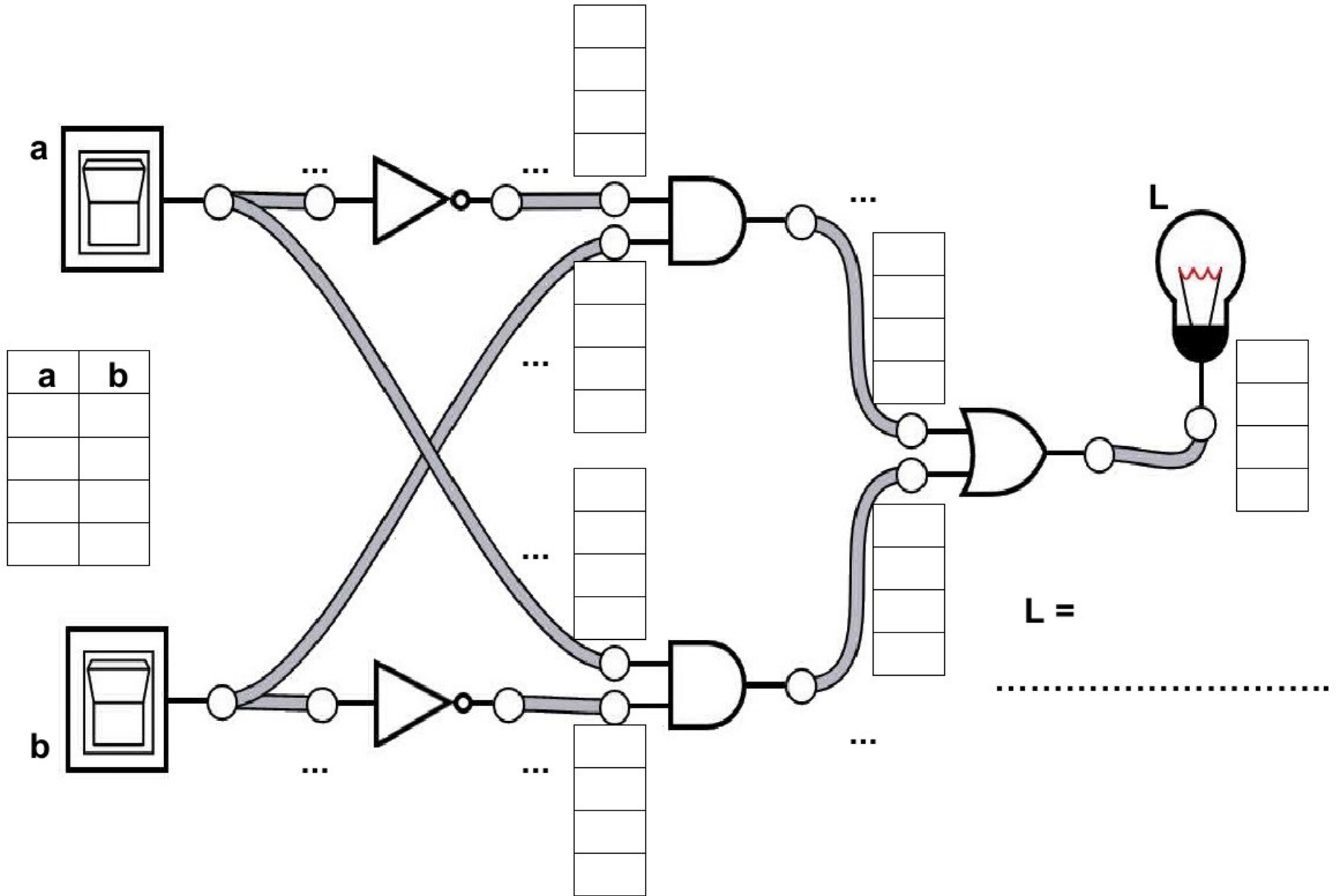
$$\overline{e1 + e2} = \overline{e1 \cdot e2}$$

Exercice



L =

Exercice



Exercice

