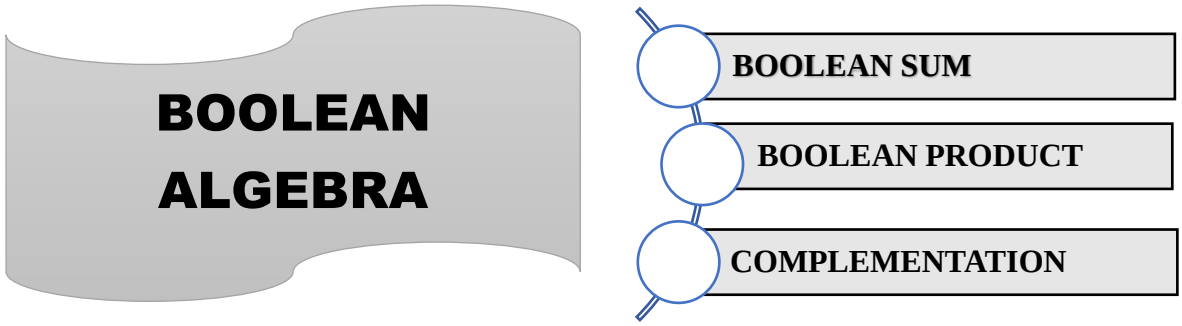


COMPLEMENTATION

X	X'
0	1
1	0

BOOLEAN SUM

X	Y	F=X+Y
0	0	0
0	1	1
1	0	1
1	1	1

BOOLEAN PRODUCT

X	Y	F=X•Y
0	0	0
0	1	0
1	0	0
1	1	1

Example 1:

Find the value of
$1.0 + (\overline{0 + 1})$

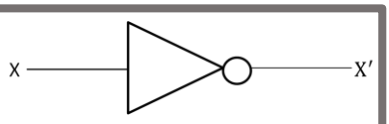
Solution:
$1.0 + (\overline{0 + 1})$
$= 0 + (\overline{1})$
$= 0 + 0$
$= 0$

IDENTITIES OF BOOLEAN ALGEBRA

IDENTITY	NAME
$\overline{\overline{x}} = x$	**Law of the double complement**
$x + x = x$ $x.x = x$	**Idempotent laws**
$x + 0 = x$ $x.1 = x$	**Identity laws**
$x + 1 = 1$ $x.0 = 0$	**Domination laws**
$x + y = y + x$ $xy = yx$	**Commutative laws**
$x + (y + z) = (x + y) + z$ $x(yz) = (xy)z$	**Associative laws**
$x + yz = (x + y)(x + z)$ $x(y + z) = xy + xz$	**Distributive laws**
$\overline{(xy)} = \overline{x} + \overline{y}$ $\overline{(x + y)} = \overline{x}\overline{y}$	**De Morgan's laws**
$x + xy = x$ $x(x + y) = x$	**Absorption laws**
$x + \overline{x} = 1$	**Unit property**
$x\overline{x} = 0$	**Zero property**

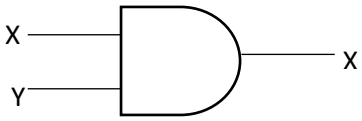
LOGIC GATES

1- The Inverter



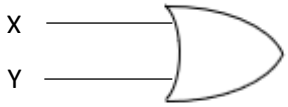
Performs the Boolean **NOT** operation.

1- The AND Gate



Performs the Boolean **AND** operation

1- The OR Gate

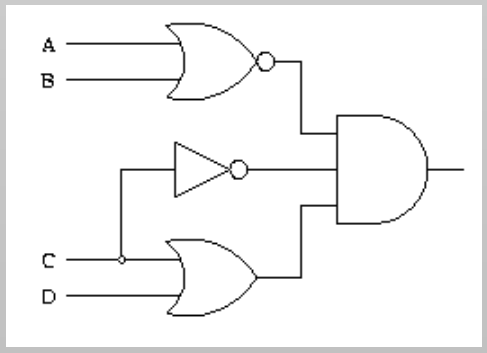


Performs the Boolean **AND** operation

Example 2 :

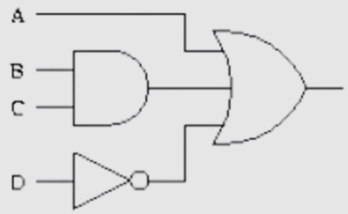
DRAW A LOGIC CIRCUIT CORRESPONDING TO THE BOOLEAN EXPRESSION

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

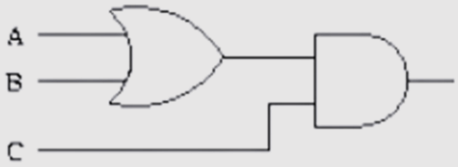


Example 3:

EXPRESS THE OUTPUT FROM THE GIVEN CIRCUITS



$Y = A + BC + \overline{D}$



$Y = (A + B)C$

Example 4:

MINIMIZE BOOLEAN EXPRESSION USING KARNAUGH MAP

Minimize the following Boolean expression by using K-map.

$$F(x, y, z) = xyz + xy\bar{z} + x\bar{y}z$$

	yz	$y\bar{z}$	$\bar{y}\bar{z}$	$\bar{y}z$
x	1	1	0	1
$\bar{x}$	0	0	0	0

$$= xy + xz$$