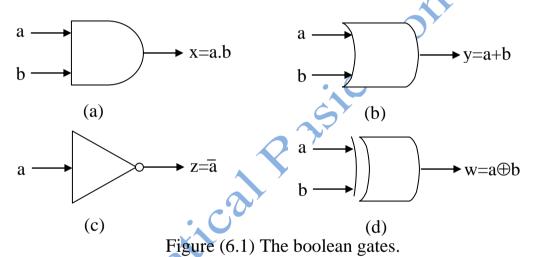
Lecture One

Mathematical Basic Concepts

6. Algebra Description of Logic Circuits

In electronically logical circuits (which are subject to the Boolean algebra), there are small circuits called Gates which are, for example, part from transistors, diodes, capacitors, and etc, these gates are shown in figure (6.1):



- (a). The gate AND: is multiplying the input variables.
- (b). The gate OR: summing the input variables.
- (c). The gate NOT: complement of the input variable.
- (d). The gate XOR: summing XOR the input variables.

These gates are shown in the table (5.1).

Table (6.1) The truth tables of the four gates.

•	0	1
0	0	0

+	0	1
0	0	1

a	a
0	1

\oplus	0	1
0	0	1

1	0	1	1	1	1	1	0	1	1	0

Definition (6.1): The logical function f is called the **output function** defined $f:B^n \to B$, where B^n is a set of n input binary data, f subject to the Boolean algebra laws and we can apply the gates concepts on it, s.t. $x=f \circ g$, y=f+g, $z=\overline{f}$, and $w=f \oplus g$, where f and g are Boolean functions.

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