1. Basic Definition

=Boolean algebra=, like any other deductive mathematical system, may be defined with a set of elements, a set of operators, and a number of unproved axioms or postulates

A =binary operator= defined on a set S of elements is a rule that assigns to each pair of elements from S a unique element from S. *As an example, consider the relation ab = c. We say that* is a binary operator if it specifies a rule for finding c from the pair (a, b) and also if a, b, c $\in$ S. However, *is not a binary operator if a, b $\in$ S, while the rule finds c $\notin$ S.*

The postulates of a mathematical system form the basic assumptions from which it is possible to deduce the rules, theorems, and properties of the system. The most common postulates used to formulate various algebraic structures are: 1. Closure. A set S is closed with respect to a binary operator if, for every pair of elements of S, the binary operator specifies a rule for obtaining a unique element of S. 2. =Associative law= A binary operator $*$ on a set S is said to be associative whenever

$$(x * y) * z = x * (y * z) \forall x, y, z \in S$$

3. =Commutative Law= A binary operator $*$ on a set S is said to be commutative whenever

$$x * y = y * x \forall x, y \in S$$

4. =Identity Element= A set S is said to have identity element with respect to a binary operation $*$ on S if there exists an element e $\in$ S with property

$$e \backslash * \backslash x = x \backslash * \backslash e = x \forall x \in S$$

5. Inverse A set S having the identity element e with respect to a binary operator *is said to have an inverse whenever, for every x $\in$ S, there exists an element y $\in$ S such that $$xy = e*

6. $== DistributiveLaw == if \backslash * \backslash and \backslash . \backslash aretwobinaryoperatorsonasetS, \backslash * \backslash issaidtobedistributiveover \backslash . \backslash w$

x*(y . z)* = *(x*y).(x*z)$$