

## Axioms - basic properties assumed to be true

(A1) $X=0$ if $X \neq 1$	(A1') $X=1$ if $X \neq 0$
(A2) if $(X=0)$ then $X'=1$	(A2') if $(X=1)$ then $X'=0$
(A3) $0*0=0$	(A3') $1+1=1$
(A4) $1*1=1$	(A4') $0+0=0$
(A5) $0*1=1*0=0$	(A5') $1+0=0+1=1$

Axioms establish

- Possible values (0, 1)
- Definitions of operations AND (\*), OR (+), NOT(')

## Theorems – Follow from axioms

<i>Theorem</i>	<i>Complement</i>	<i>Name</i>
(T1) $X+0=X$	(T1') $X*1=X$	<i>Identities</i>
(T2) $X+1=1$	(T2') $X*0=0$	<i>Null elements</i>
(T3) $X+X=X$	(T3') $X*X=X$	<i>Idempotency</i>
(T4) $(X')'=X$		<i>Involution</i>
(T5) $X+X'=1$	(T5) $X*X'=0$	<i>Complements</i>
(T6) $X+Y=Y+X$	(T6') $X*Y=Y*X$	<i>Commutativity</i>
(T7) $(X+Y)+Z=X+(Y+Z)$	(T7') $(X*Y)*Z=X*(Y*Z)$	<i>Associativity</i>
(T8) $X*Y+X*Z = X*(Y+Z)$	(T8') $(X+Y)*(X+Z) = X+Y*Z$	<i>Distributivity</i>
(T9) $X+X*Y=X$	(T9') $X*(X+Y)=X$	<i>Covering</i>
(T10) $X*Y+X*Y'=X$	(T10') $(X+Y)*(X+Y')=X$	<i>Combining</i>
(T11) $X*Y + X'*Z + Y*Z$ $= X*Y + X'*Z$	(T11') $(X+Y)*(X'+Z)*(Y+Z)$ $= (X+Y)*(X'*Z)$	<i>Consensus</i>
(T12) $X+X+X+\dots+X=X$	(T12') $X*X*X*\dots*X=X$	<i>Generalized idempotency</i>
(T13) $(X+Y)' = X' * Y'$	(T13') $(X*Y)' = X' + Y'$	<i>DeMorgan</i>

You must have T6, T7, T8 and T13 memorized by name. The others you may need to use, but I won't make you memorize their names.