BOOLEAN ALGEBRA SUMMARY

Operations with 0 and 1:
1. $X + 0 = X$ 1D. $X \cdot 1 = X$
2. $X + 1 = 1$ 2D. $X \cdot 0 = 0$

Idempotent laws:
3. $X + X = X$ 3D. $X \cdot X = X$

Involution law:
4. $(X')' = X$

Laws of complementarity:
5. $X + X' = 1$ 5D. $X \cdot X' = 0$

Commutative laws:
6. $X + Y = Y + X$ 6D. $XY = YX$

Associative laws:
7. $(X + Y) + Z = X + (Y + Z)$ 7D. $(XY)Z = X(YZ) = XYZ$
$\qquad\qquad = X + Y + Z$

Distributive laws:
8. $X(Y + Z) = XY + XZ$ 8D. $X + YZ = (X + Y)(X + Z)$

Simplification theorems:
9. $XY + XY' = X$ 9D. $(X + Y)(X + Y') = X$
10. $X + XY = X$ 10D. $X(X + Y) = X$
11. $(X + Y')Y = XY$ 11D. $XY' + Y = X + Y$

DeMorgan's laws:
12. $(X + Y + Z + ...)' = X'Y'Z'...$
12D. $(XYZ...)' = X' + Y' + Z' + ...$

The **duality principle** states that every algebraic expression deducible from the postulates of Boolean algebra remains valid if the operators and identity elements are interchanged.