Laws of Boolean Algebra

Duality: Replace " • " by " + " (and vice versa), also
Replace " 0 " by " 1 " (and vice versa)

NOTE: Duality is NOT the same as DeMorgan's law !!!

Useful Laws/Theorems of Boolean Algebra:

Operations with 0 and 1: 1. $X + 0 = X$ 2. $X + 1 = 1$	1D. $X \cdot 1 = X$ 2D. $X \cdot 0 = 0$
Idempotent Law: 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 Law: 6. $X + Y = Y + X$	6D. $X \cdot Y = Y \cdot X$
Associative Laws: 7. $(X + Y) + Z = X + (Y + Z)$ $= X + Y + Z$	7D. $(X \cdot Y) \cdot Z = X \cdot (Y \cdot Z)$ $= X \cdot Y \cdot Z$
Distributive Laws: 8. $X \cdot (Y + Z) = (X \cdot Y) + (X \cdot Z)$	8D. $X + (Y \cdot Z) = (X + Y) \cdot (X + Z)$
Simplification Theorems: 9. $X \cdot Y + X \cdot Y' = X$ 10. $X + X \cdot Y = X$ 11. $(X + Y') \cdot Y = X \cdot Y$	9D. $(X + Y) \cdot (X + Y') = X$ 10D. $X \cdot (X + Y) = X$ 11D. $(X \cdot Y') + Y = X + Y$
DeMorgan's Law: 12. $\overline{(X + Y + Z + \ldots)} = \overline{X} \cdot \overline{Y} \cdot \overline{Z} \cdot \ldots$	12D. $\overline{(X \cdot Y \cdot Z \cdot \ldots)} = \overline{X} + \overline{Y} + \overline{Z} + \ldots$
Duality: 13. $(X + Y + Z + \ldots)^D = X \cdot Y \cdot Z \cdot \ldots$	13D. $(X \cdot Y \cdot Z \cdot \ldots)^D = X + Y + Z + \ldots$
Theorems for Multiplying and Factoring: 14. $(X + Y) \cdot (X' + Z) = X \cdot Z + X' \cdot Y$	14D. $X \cdot Y + X' \cdot Z = (X + Z) \cdot (X' + Y)$
Consensus Theorem: 15. $(X \cdot Y) + (Y \cdot Z) + (X' \cdot Z) =$ $X \cdot Y + X' \cdot Z$	15. $(X + Y) \cdot (Y + Z) \cdot (X' + Z) =$ $(X + Y) \cdot (X' + Z)$