LAWS AND THEOREMS OF BOOLEAN ALGEBRA

Identity	Dual
Operations with 0 and 1: 1. X + 0 = X (identity) 3. X + 1 = 1 (null element)	2. X.1 = X 4. X.0 = 0
Idempotency theorem: 5. X + X = X	6. X.X = X
Complementarity: 7. X + X’ = 1	8. X.X’ = 0
Involution theorem: 9. (X’)’ = X	
Identities for multiple variables	
Cummutative law: 10. X + Y = Y + X	11. X.Y = Y X
Associative law: 12. (X + Y) + Z = X + (Y + Z) = X + Y + Z	13. (XY)Z = X(YZ) = XYZ
Distributive law: 14. X(Y + Z) = XY + XZ	15. X + (YZ) = (X + Y)(X + Z)
DeMorgan’s theorem: 16. (X + Y + Z + ...)’ = X’Y’Z’... or $\{f(X_1,X_2,...,X_n,0,1,+,.)\}$ $= \{f(X_1',X_2',...,X_n',1,0,.,+)\}$	17. (XYZ...)’ = X’ + Y’ + Z’ + ...
Simplification theorems: 18. XY + XY’ = X (uniting) 20. X + XY = X (absorption) 22. (X + Y’)Y = XY (adsorption)	19. (X + Y)(X + Y’) = X 21. X(X + Y) = X 23. XY’ + Y = X + Y
Consensus theorem: 24. XY + X’Z + YZ = XY + X’Z	25. (X + Y)(X’ + Z)(Y + Z) = (X + Y)(X’ + Z)
Duality:	

26. $(X + Y + Z + ...)^D = XYZ...$ or $\{f(X_1,X_2,...,X_n,0,1,+,.)\}^D = f(X_1,X_2,...,X_n,1,0,.,+)$	27. $(XYZ ...)^D = X + Y + Z + ...$

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