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Laws and Theorems of Boolean Algebra

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. $X \cdot X = X$
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Involution law:

4. $(X')' = X$

Laws of complementarity:

5. $X + X' = 1$	5D. $X \cdot X' = 0$
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Commutative laws:

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

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

8. $X(Y + Z) = XY + XZ$	8D. $X + YZ = (X + Y)(X + Z)$
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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. $(X + Y + Z + \dots)' = X'Y'Z' \dots$	12D. $(XYZ \dots)' = X' + Y' + Z' + \dots$
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Duality:

13. $(X + Y + Z + \dots)^D = XYZ \dots$	13D. $(XYZ \dots)^D = X + Y + Z + \dots$
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Theorem for multiplying out and factoring:

14. $(X + Y)(X' + Z) = XZ + X'Y$	14D. $XY + X'Z = (X + Z)(X' + Y)$
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Consensus theorem:

15. $XY + YZ + X'Z = XY + X'Z$	15D. $(X + Y)(Y + Z)(X' + Z)$ $= (X + Y)(X' + Z)$
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