BOOLEAN ALGEBRA

1. **Absorption Laws:**

   $A + A \cdot B = A$

   $A(A + B) = A$

2. $A + A'B = A + B$

   $A \cdot (A' + B) = A \cdot B$

3. **Transposition Theorem:**

   $AB + A'C = (A + C) \cdot (A' + B)$

4. **Consensus Theorem:**

   $AB + A'C + BC = AB + A'C$

   $(A + B) \cdot (A' + C) \cdot (B + C) = (A + B) \cdot (A' + C)$

Duals

Given Expression	Dual
1. $\overline{0} = 1$	$\overline{1} = 0$
2. $0 \cdot 1 = 0$	$1 + 0 = 1$
3. $0 \cdot 0 = 0$	$1 + 1 = 1$
4. $1 \cdot 1 = 1$	$0 + 0 = 0$
5. $A \cdot 0 = 0$	$A + 1 = 1$
6. $A \cdot 1 = A$	$A + 0 = A$
7. $A \cdot A = A$	$A + A = A$
8. $A \cdot \overline{A} = 0$	$A + \overline{A} = 1$
9. $A \cdot B = B \cdot A$	$A + B = B + A$
10. $A \cdot (B \cdot C) = (A \cdot B) \cdot C$	$A + (B + C) = (A + B) + C$
11. $A \cdot (B + C) = AB + AC$	$A + BC = (A + B)(A + C)$
12. $A(A + B) = A$	$A + AB = A$
13. $A \cdot (A \cdot B) = A \cdot B$	$A + A + B = A + B$
14. $\overline{AB} = \overline{A} + \overline{B}$	$\overline{A + B} = \overline{A}\ \overline{B}$
15. $(A + B)(\overline{A} + C)(B + C)$ $= A + B(\overline{A} + C)$	$AB + \overline{A}C + BC = AB + \overline{A}C$
16. $(A + C)(\overline{A} + B) = AB + \overline{A}C$	$AC + \overline{A}B = (A + B)(\overline{A} + C)$
17. $A + \overline{B}C = (A + \overline{B})(A + C)$	$A(\overline{B} + C) = (A\overline{B} + AC)$
18. $(A + B)(C + D) = AC +$ $AD + BC + BD$	$(AB + CD) = (A + C)(A + D)$ $(B + C)(B + D)$
19. $A + B = AB + \overline{A}B + A\overline{B}$	$AB = (A + B)(\overline{A} + B)(A + \overline{B})$
20. $A + B(\overline{C + DE}) = A + B\overline{C}DE$	$A[B + \overline{(C \cdot D + E)}]$ $= A \cdot (B + \overline{C} + D + E)$
21. $\overline{AB + \overline{A} + AB} = 0$	$\overline{A + B \cdot \overline{A} \cdot (A + B)} = 1$
22. $AB + \overline{A}C + A\overline{B}C(AB + C) = 1$	$(A + B)(\overline{A} + C) \cdot [(A + \overline{B} + C)$ $+ (A + B)C] = 0$

Duality principle:

Every theorem has an equivalent theorem by performing the following operation:

1. Change every AND operation to OR operation (Change every dot sign to plus sign) and vice-versa.

2. Change every '0' to '1' and vice-versa.