

Boolean Algebra

- Negation

$$A = \overline{\overline{A}}$$

- Boolean algebra laws

- Commutative Law:

$$\begin{aligned}A + B &= B + A \\A \cdot B &= B \cdot A\end{aligned}$$

- Associative Law:

$$\begin{aligned}A + (B + C) &= (A + B) + C \\A \cdot (B \cdot C) &= (A \cdot B) \cdot C\end{aligned}$$

- Distributive Law:

$$\begin{aligned}A + (B \cdot C) &= (A + B) \cdot (A + C)^1 \\A \cdot (B + C) &= (A \cdot B) + (A \cdot C)\end{aligned}$$

¹This does not follow normal algebraic rules.

- De Morgan's Laws

$$\begin{aligned}\overline{AB} &= \overline{A} + \overline{B} \\ \overline{A + B} &= \overline{A} \cdot \overline{B}\end{aligned}$$

These work for any number of terms:

$$\begin{aligned}\overline{ABC} &= \overline{A} + \overline{B} + \overline{C} \\ \overline{A + B + C} &= \overline{A} \cdot \overline{B} \cdot \overline{C}\end{aligned}$$