Boolean algebra

- Represent functions as expressions using variables, NOT, AND, OR, etc.
- AND is represented with multiplication, OR by addition, NOT with a bar over the variable

$$F = ABC + A\overline{BC}$$

- Other forms use $\vee$ for OR, $\wedge$ for AND, and $\neg$ for NOT

$$F = A \wedge B \wedge C \vee A \wedge \neg(A \wedge C)$$

Boolean identities

Identity law $1A = A$, $0 + A = A$

Null law $0A = 0$, $1 + A = 1$

Idempotent law $AA = A$, $A + A = A$

Inverse law $A\overline{A} = 0$, $A + \overline{A} = 1$

Commutative law $AB = BA$, $A + B = B + A$

Associative law $(AB)C = A(BC)$, $(A + B) + C = A + (B + C)$

Distributive law $A + BC = (A + B)(A + C)$, $A(B + C) = AB + AC$

Absorption law $A(A + B) = A$, $A + AB = A$

De Morgan's Law $\overline{AB} = \overline{A} + \overline{B}$, $\overline{A + B} = \overline{A}\,\overline{B}$

A	B	X
0	0	0
0	1	0
1	0	0
1	1	1

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Actual addition
↓
A + B

A	B	Sum	Carry
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

Sum is exclusive or (XOR)

Carry is AND