

## Boolean Algebra Rules

$$A + 0 = A$$

$$A + 1 = 1$$

$$A \times 0 = 0$$

$$A \times 1 = A$$

$$A + A = A$$

$$A + A' = 1$$

$$A \times A = A$$

$$A \times A' = 0$$

$$A'' = A$$

$$A + A'B = A + B$$

$$A + AB = A(1+B) = A(1) = A$$

$$(A+B)(A+C) = A+BC$$

$$A + B = B + A$$

$$AB = BA$$

$$A+B+C = A+(B+C)$$

$$A(B+C) = AB+AC$$

## Laws

Commutative Law  $A \times B = B \times A$

$$A + B = B + A$$

Associative Law  $A \times (B \times C) = (A \times B) \times C$

$$A + (B + C) = (A + B) + C$$

Distributive Law  $A \times (B + C) = A \times B + A \times C$

$$A + B \times C = (A+B)(A+C)$$

## DeMorgan Rules

$$(AB)' = A' + B'$$

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

$$Y' = A' \times B \times C$$

$$Y = (A' \times B \times C)'$$

$$Y = A \times B' \times C'$$

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

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

## Theorems

Theorem 1  $X + X \cdot Y = X$

Theorem 2  $X + X' \cdot Y = X + Y$

Theorem 3  $X \cdot Y + X' \cdot Z + Y \cdot Z = X \cdot Y + X' \cdot Z$

Theorem 4  $X(X + Y) = X$

Theorem 5  $X(X' + Y) = X \cdot Y$

Theorem 6  $(X + Y)(X + Y') = X$

Theorem 7  $(X + Y)(X' + Z) = X \cdot Z + X' \cdot Y$

Theorem 8  $(X + Y)(X' + Z)(Y + Z) = (X + Y)(X' + Z)$

## Binary & Gray Code

Decimal numbers	Binary code	Gray code
0	0000	0000
1	0001	0001
2	0010	0011
3	0011	0010
4	0100	0110
5	0101	0111
6	0110	0101
7	0111	0100
8	1000	1100
9	1001	1101
10	1010	1111
11	1011	1110
12	1100	1010
13	1101	1011
14	1110	1001
15	1111	1000

