

CSC 258

Some Boolean algebra identities

identity laws:

$$a \cdot 1 = a$$

$$a + 0 = a$$

base laws:

$$a \cdot 0 = 0$$

$$a + 1 = 1$$

idempotence:

$$aa = a$$

$$a + a = a$$

excluded middle:

$$a + \bar{a} = 1$$

non-contradiction:

$$a \cdot \bar{a} = 0$$

double-negation:

$$\bar{\bar{a}} = a$$

exclusive-or definition:

$$a \oplus b = a\bar{b} + \bar{a}b$$

commutative:

$$ab = ba$$

$$a + b = b + a$$

$$a \oplus b = b \oplus a$$

associative:

$$(ab)c = a(bc)$$

$$(a + b) + c = a + (b + c)$$

$$(a \oplus b) \oplus c = a \oplus (b \oplus c)$$

distributive:

$$a(b + c) = ab + ac$$

$$a + bc = (a + b)(a + c)$$

de Morgan's laws:

$$\overline{a + b} = \bar{a}\bar{b}$$

$$\overline{(ab)} = \bar{a} + \bar{b}$$

etc

absorption:

$$a(a + b) = a$$

$$a + ab = a$$

$$a + \bar{a}b = a + b$$

no name:

$$ab + a\bar{b} = a$$