CSC 258
Some Boolean algebra identities
identity laws:

$$
\begin{aligned}
& a \cdot 1=a \\
& a+0=a
\end{aligned}
$$

base laws:

$$
\begin{aligned}
& a \cdot 0=0 \\
& a+1=1
\end{aligned}
$$

idempotence:

$$
\begin{aligned}
& a a=a \\
& a+a=a
\end{aligned}
$$

excluded middle:

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

non-contradiction:

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

double-negation:

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

exclusive-or definition:

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

commutative:

$$
\begin{aligned}
& a b=b a \\
& a+b=b+a \\
& a \oplus b=b \oplus a
\end{aligned}
$$

associative:

$$
\begin{aligned}
& (a b) c=a(b c) \\
& (a+b)+c=a+(b+c) \\
& (a \oplus b) \oplus c=a \oplus(b \oplus c)
\end{aligned}
$$

distributive:

$$
\begin{aligned}
& a(b+c)=a b+a c \\
& a+b c=(a+b)(a+c)
\end{aligned}
$$

de Morgan's laws:

$$
\begin{aligned}
& \overline{a+b}=\bar{a} \bar{b} \\
& \overline{(a b)}=\bar{a}+\bar{b} \\
& \text { etc }
\end{aligned}
$$

absorption:

$$
\begin{aligned}
& a(a+b)=a \\
& a+a b=a \\
& a+\bar{a} b=a+b
\end{aligned}
$$

no name:

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

