Laws of logic:
Bitwise Operators

Zero is always represented by all 0's. For signed values, -1 is always represented by all ones.

A. Negation, Associativity, Commutativity

Negation:

$\sim(\sim p) = p$

Associative:

$(p \mid q) \mid r = p \mid (q \mid r)$

$(p \,\&\, q) \,\&\, r = p \,\&\, (q \,\&\, r)$

Commutative:

$p \mid q = q \mid p$

$p \,\&\, q = q \,\&\, p$

B. De Morgan's laws

$\sim(p \mid q) = \sim p \,\&\, \sim q$

$\sim(p \,\&\, q) = \sim p \mid \sim q$

$\sim(\sim p \mid \sim q) = p \,\&\, q$

$\sim(\sim p \,\&\, \sim q) = p \mid q$

C. Identity laws:

$p \mid 0 = p$

$p \,\&\, 0 = 0$

$p \mid -1 = -1$

$p \,\&\, -1 = p$

D. Inverse Laws:

$p \mid \sim p = -1$

$p \,\&\, \sim p = 0$

E. Idempotent Laws:

$p \mid p = p$

$p \,\&\, p = p$

$(p \,\&\, q) \mid (p \,\&\, q) = p\&q$

$(p \mid q) \,\&\, (p \mid q) = (p \mid q)$

F. Distributive Laws:

$p \,\&\, q \mid r = (p \mid r) \,\&\, (q \mid r)$

$(p \mid r) \,\&\, (q \mid r) = (p \,\&\, q) \mid r$

$(p \mid q) \,\&\, r = (p \,\&\, r) \mid (q \,\&\, r)$

$(p \,\&\, r) \mid (q \,\&\, r) = (p \mid q) \,\&\, r$

G. Absorption Laws:

$p \,\&\, (p \mid q) = p$

$p \mid (p \,\&\, q) = p$

Laws of logic:
Logical Operators

The value “false” is represented by 0, “true” is represented by 1.

A. Negation, Associativity, Commutativity

Negation:

!(!p) = p

Associative:

(p || q) || r = p || (q || r)

(p && q) && r = p && (q && r)

Commutative:

p || q = q || p

p && q = q && p

B. De Morgan's laws:

!(p || q) = !p && !q

!(p && q) = !p || !q

!(!p || !q) = p && q

!(!p && !q) = p || q

C. Identity laws:

p || 0 = p

p && 0 = 0

p || 1 = 1

p && 1 = p

D. Inverse Laws:

p || !p = 1

p && !p = 0

E. Idempotent Laws:

p || p = p

p && p = p

(p && q) || (p && q) = p && q

(p || q) && (p || q) = (p || q)

F. Distributive Laws:

(p && q) || r = (p || r) && (q || r)

(p || r) & (q || r) = (p && q) || r

(p || q) && r = (p && r) || (q && r)

(p && r) || (q && r) = (p || q) && r

G. Absorption Laws:

p && (p || q) = p

p || (p && q) = p