

$$1a: 0 \cdot 0 = 0$$

$$1b: 1 + 1 = 1$$

$$2a: 1 \cdot 1 = 1$$

$$2b: 0 + 0 = 0$$

$$3a: 0 \cdot 1 = 1 \cdot 0 = 0$$

$$3b: 0 + 1 = 1 + 0 = 1$$

$$4a: \text{If } x = 0, \text{ then } !x = 1$$

$$4b: \text{If } x = 1, \text{ then } !x = 0$$

$$5a: x \cdot 0 = 0$$

$$5b: x + 1 = 1$$

$$6a: x \cdot 1 = x$$

$$6b: x + 0 = x$$

$$7a: x \cdot x = x$$

$$7b: x + x = x$$

$$8a: x \cdot !x = 0$$

$$8b: x + !x = 1$$

$$9: \neg\neg x = x$$

$$10a: x \cdot y = y \cdot x$$

Commutative

$$10b: x + y = y + x$$

$$11a: x \cdot (y \cdot z) = (x \cdot y) \cdot z$$

Associative

$$11b: x + (y + z) = (x + y) + z$$

$$12a: x \cdot (y + z) = (x \cdot y) + (x \cdot z)$$

Distributive

$$12b: x + (y \cdot z) = (x + y) \cdot (x + z)$$

$$13a: x + (x \cdot y) = x$$

Absorption

$$13b: x \cdot (x + y) = x$$

$$14a: (x \cdot y) + (x \cdot \neg y) = x$$

Combining

$$14b: (x + y) \cdot (x + \neg y) = x$$

$$15a: \neg(x \cdot y) = \neg x + \neg y$$

DeMorgan's 1<sup>st</sup> Theorems

$$15b: \neg(x + y) = \neg x \cdot \neg y$$

$$16a: x + (\neg x \cdot y) = x + y$$

DeMorgan's 2<sup>nd</sup> Theorems

$$16b: x \cdot (\neg x + y) = x \cdot y$$

$$17a: (x \cdot y) + (y \cdot z) + (\neg x \cdot z) = (x \cdot y) + (\neg x \cdot z)$$

Consensus

$$17b: (x + y) \cdot (y + z) \cdot (\neg x + z) = (x + y) \cdot (\neg x + z)$$