

Activity 2.1.5a Boolean and DeMorgan's Theorems

Boolean Theorems:

$$1) \quad X \bullet 0 = 0$$

$$5) \quad X + 0 = X$$

$$9) \quad \overline{\overline{X}} = X$$

$$2) \quad X \bullet 1 = X$$

$$6) \quad X + 1 = 1$$

$$3) \quad X \bullet X = X$$

$$7) \quad X + X = X$$

$$4) \quad X \bullet \overline{X} = 0$$

$$8) \quad X + \overline{X} = 1$$

Commutative Law

$$10A) \quad X \bullet Y = Y \bullet X$$

$$10B) \quad X + Y = Y + X$$

Associative Law

$$11A) \quad X(YZ) = (XY)Z$$

$$11B) \quad X + (Y + Z) = (X + Y) + Z$$

Distributive Law

$$12A) \quad X(Y + Z) = XY + XZ$$

$$12B) \quad (X + Y)(W + Z) = XW + XZ + YW + YZ$$

Consensus Theorems

$$13A) \quad X + \overline{X}Y = X + Y$$

$$13B) \quad \overline{X} + XY = \overline{X} + Y$$

$$13C) \quad X + \overline{X}\overline{Y} = X + \overline{Y}$$

$$13D) \quad \overline{X} + X\overline{Y} = \overline{X} + \overline{Y}$$

$$13E) \quad X + XY = X$$

DeMorgan's Theorems

$$14A) \quad \overline{XY} = \overline{X} + \overline{Y}$$

$$14B) \quad \overline{\overline{X} + \overline{Y}} = \overline{X} \bullet \overline{Y}$$