Assignment of Boolean Algebra

1) $XYZ + XY'Z + XYZ'$

Solution

$= XYZ + XY'Z + XYZ' = XZ(Y+Y') + XYZ'$

$= XZ + XYZ'$ $[Y + Y' = 1]$

$= X(Z + YZ')$

$= X[(Z+Y).(Z+Z')]$ [distributive Law]

$= X[(Z+Y).1]$ $[Z+Z'=1]$

$= X(Z+Y)$

$= X(Y+Z)$

2) $XY + YZ + Y'Z = XY + Z$ Prove

LHS: $XY + YZ + Y'Z$

$\cancel{= XY + Z(Z +}$

$= XY + Z(Y + Y')$

$= XY + Z$ $[Y + Y' = 1]$

$= RHS$

HP

3) $AB + A'C = AB + A'C + BC$

LHS:

$$AB + A'C = AB(1+C) + A'C(1+B)$$
$$= AB + ABC + A'C + A'BC$$
$$= AB + A'C + BC(A + A')$$
$$= AB + A'C + BC$$

4) $\overline{\overline{A\bar{B} + ABC} + A(B + \bar{A}B)} = 0$

$$= \overline{\overline{A(\bar{B} + BC)} + A(B + \bar{A}B)}$$

$$= \overline{\overline{A(\bar{B} + C)} + A(B + A)} \quad [A + \bar{A}B = A + B]$$

$$= \overline{\overline{A\bar{B} + CA} + AB + AA}$$

$$= \overline{\overline{A\bar{B} + CA} + A(1+B)} \quad [\because 1 + B = 1]$$

$$= \overline{\overline{A\bar{B} + CA} + A}$$

$$= \overline{\overline{A\bar{B}} \cdot \overline{CA} + A}$$

$$= \overline{(\bar{A} + B) \cdot (\bar{A} + \bar{C}) + A}$$

$$= \overline{\bar{A}\bar{A} + \bar{A}\bar{C} + \bar{A}B + B\bar{C} + A}$$

$$= \cancel{\bar{A}(\bar{A} + \bar{C} + B) + B}$$

$$= \overline{\bar{A}(1+B+\bar{C}) + B\bar{C} + A}$$

$$= \overline{\bar{A} + B\bar{C} + A}$$

$$= \overline{1 + B\bar{C}} = \bar{1} = 0$$