

Exercise one

الأسئلة: Simplify the following Logic Expression:

1) Simplify the following Logic Expression:-

$$\begin{aligned} 1. & X + XY \\ &= X(1 + Y) \\ &= X \cdot 1 \\ &= \boxed{X} \end{aligned}$$

$$\begin{aligned} 2. & XY + XY' \\ &= X(Y + Y') \\ &= X \cdot 1 \\ &= \boxed{X} \end{aligned}$$

$$\begin{aligned} 3. & X + XY' \\ &= X(1 + Y') \\ &= X \cdot 1 \\ &= \boxed{X} \end{aligned}$$

~~XXXXX~~

$$\begin{aligned} 4. & X(X + Y) \\ &= XX + XY \\ &= X + XY \\ &= X(1 + Y) \\ &= X \cdot 1 \\ &= \boxed{X} \end{aligned}$$

$$\begin{aligned} 5. & (X + Y)(X + Y') \\ &= X + (Y \cdot Y') \\ &= X + 0 \\ &= \boxed{X} \end{aligned}$$

$$\begin{aligned} 6. & X(X' + Y) \\ &= XX' + XY \\ &= 0 + XY \\ &= \boxed{XY} \end{aligned}$$

$$\begin{aligned} 7. & XYZ' + XY'Z' + XZ \\ &= XZ'(Y + Y') + XZ \\ &= XZ' \cdot 1 + XZ \\ &= XZ' + XZ \\ &= X(Z' + Z) \\ &= X \cdot 1 = \boxed{X} \end{aligned}$$

$$\begin{aligned} 8. & XY + XZ' + YZ \\ &= XYZ + XYZ' + XZ' + YZ \\ &= XYZ + XZ'(Y + 1) + YZ \\ &= XYZ + XZ' + YZ \\ &= YZ(X + 1) + XZ' \\ &= YZ + XZ' \\ &= XZ' + YZ \end{aligned}$$

$$\begin{aligned} 9. & (A + B)(A' + C) \\ &= A'(A + B) + (A + B)C \\ &= A'A + A'B + (A + B)C \\ &= 0 + A'B + AC + BC \\ &= A'B + AC + BC \\ &= A'B + AC \end{aligned}$$

$$\begin{aligned}
10. F &= a + a'b + a'b'C + a'b'C'd + a'b'C'd'e \\
\text{ass} &= (a + a'b) + a'b'C + a'b'C'd + a'b'C'd'e \\
\text{abs} &= a + b + a'b'C + a'b'C'd + a'b'C'd'e \\
\text{dis} &= a + b + a'b'(C + C'd) + a'b'C'd'e \\
\text{abs} &= a + b + a'b'(C + d) + a'b'C'd'e \\
\text{dis} &= a + b + a'b'C + a'b'd + a'b'C'd'e \\
\text{dis} &= a + b + a'b'C + a'b'(d + C'd'e) \\
\text{abs} &= a + b + a'b'C + a'b'(d + C'e) \\
\text{dis} &= a + b + a'b'C + a'b'd + a'b'C'e \\
\text{dis} &= a + b + a'b'(C + C'e) + a'b'd \\
\text{abs} &= a + b + a'b'(C + e) + a'b'd \\
\text{dis} &= a + (b + a'b'C) + a'b'd + a'b'e \\
\text{abs} &= a + (b + a'C) + a'b'd + a'b'e \\
\text{dis} &= b + (a + a'C) + a'b'd + a'b'e \\
\text{abs} &= b + (a + C) + a'b'd + a'b'e \\
&= a + b + C + a'b'd + a'b'e \rightarrow \text{apply the same} \\
& \hspace{15em} \text{with forth and fifth} \\
&= a + b + C + d + e \neq \text{ terms (absorption rule)}
\end{aligned}$$

$$\begin{aligned}
11. F &= AB + BC + B'C \\
\text{dis} &= AB + C(B + B') \\
\text{comp} &= AB + C \cdot 1 \\
&= AB + C \neq
\end{aligned}$$

$$\begin{aligned}
12. F &= (A'B'C + A'BC) + AB' \\
\text{dis} &= A'C(B' + B) + AB' \\
\text{comp} &= A'C \cdot 1 + AB' \\
&= A'C + AB' \neq
\end{aligned}$$

$$13. F = AB + (AC)' + AB'C(AB+C)$$

$$\text{demorgan} = AB + A' + C' + AB'CA B + AB'CC$$

$$= AB + A' + C' + AA B' B C + AB' C$$

$$\text{Comp} = (AB + A') + C' + 0 + 0 AB' C$$

$$\text{abs} = B + A' + (C' + AB' C)$$

$$\text{abs} = A' + B + C' + AB'$$

$$\text{abs} = A' + (B + AB') + C'$$

$$\text{dis} = A' + B + A + C'$$

$$\text{Comp} = (A' + A) + B + C'$$

$$= 1 + B + C'$$

$$= \boxed{1}$$

$$14. F = A'B \cdot C + A \cdot B'C + A \cdot B \cdot C' + A \cdot B \cdot C$$

$$\text{dis} = A'BC + AB'C + AB(C' + C)$$

$$\text{abs} = A'BC + A(B'C + B)$$

$$= A'BC + AC + AB$$

$$\text{abs} = C(A'B + A) + AB$$

$$= AC + BC + AB = AB + AC + BC$$

2 MCQ

$$1. \text{ not equivalent to } X \cdot X + X \cdot X' \rightarrow \boxed{(C) X'}$$

$$2. \text{ equivalent to } X \cdot Y + X \cdot Y \cdot Z = \boxed{(a) X \cdot Y}$$

$$= XY(1 + Z)$$

$$= XY$$

$$3. \text{ equivalent to } (X + Y) \cdot (X + Y') = \boxed{(C) X}$$

$$= X + YY'$$

$$= X + 0 = X$$

$$4. \text{ Not equivalent to } X \cdot (X' + Y) + Y \rightarrow \boxed{(C) X \cdot Y}$$

$$= XX' + XY + Y$$

$$= 0 + XY + Y$$