EE115B, Fall 2022, Homework 2
Solution

1. $Y = A \oplus B \oplus C$

Inputs: A	B	C	$A \oplus B$	Output Y
0	0	0	0	0
0	0	1	0	1
0	1	0	1	1
0	1	1	1	0
1	0	0	1	1
1	0	1	1	0
1	1	0	0	0
1	1	1	0	1

2. $\overline{A \odot B} = \overline{\bar{A}\bar{B} + AB}$

$$= \overline{\bar{A}\bar{B}} \cdot \overline{AB}$$

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

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

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

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

$$= A \oplus B$$

3. $Y(A,B,C) = (A+\bar{C})(\bar{A}+B)$ (2/2)

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

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

POS explicit $= \boxed{(A+B+\bar{C})(A+\bar{B}+\bar{C})(\bar{A}+B+C)(\bar{A}+B+\bar{C})}$

$= M_1 \cdot M_3 \cdot M_4 \cdot M_5$

POS compact $= \boxed{\Pi M(1,3,4,5)}$

SOP compact $= \boxed{\Sigma m(0,2,6,7)}$

$= m_0 + m_2 + m_6 + m_7$

SOP explicit $= \boxed{\bar{A}\bar{B}\bar{C} + \bar{A}B\bar{C} + AB\bar{C} + ABC}$

4. For SOP, work on 1's:

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

$= m_0 + m_2 + m_5$

$= \Sigma m(0,2,5)$

For POS, work on 0's:

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

$= M_1 \cdot M_3 \cdot M_4 \cdot M_6 \cdot M_7$

$= \Pi M(1,3,4,6,7)$