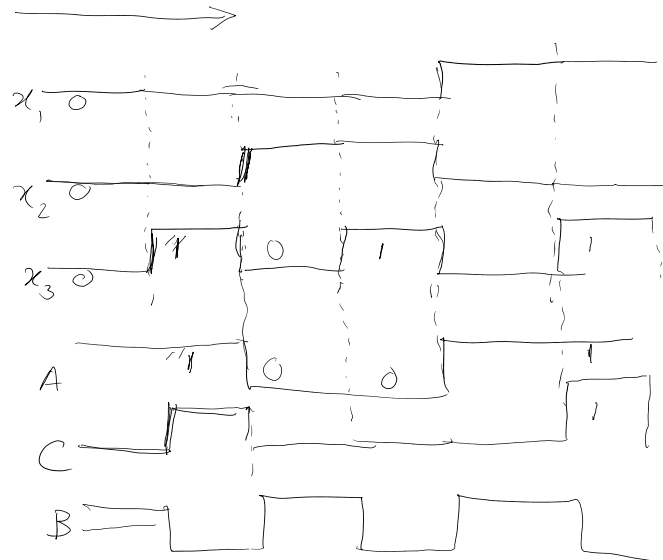


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$$\begin{array}{c} \downarrow \\ \begin{array}{ccc} x_1 & x_2 & x_3 \\ 0 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \\ \emptyset & 1 & 1 \\ 1 & 0 & 0 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \\ 1 & 1 & 1 \end{array} \end{array}$$


2.14 Use algebraic manipulation to find the minimum product-of-sums expression for the function $f = (x_1 + x_3 + x_4) \cdot (x_1 + \bar{x}_2 + x_3) \cdot (x_1 + \bar{x}_2 + \bar{x}_3 + x_4)$.

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$$\begin{aligned}
 & \left[\overbrace{(x_1 + x_3) + x_4}^{A + x_4} \right] \left[\overbrace{(x_1 + x_3) + \bar{x}_2}^{A + \bar{x}_2} \right] = \left[\overbrace{(x_1 + x_3) + \bar{x}_2 x_4} \right] \left[\overbrace{(x_1 + x_3) + \bar{x}_2 (\bar{x}_3 + x_4)} \right] \\
 & = \left[\overbrace{(x_1 + x_3) + \bar{x}_2 x_4} \right] \left[\overbrace{x_1 + x_3 + \bar{x}_2 x_3} \right] \\
 & = x_1 + (x_3 + \bar{x}_2 x_4)(x_4 + \bar{x}_2 x_3) \\
 & = x_1 + x_3 x_4 + \bar{x}_2 x_3 + \bar{x}_2 x_4 + \bar{x}_2 x_3 x_4
 \end{aligned}$$

$x \cdot x = x$
 $(x+y)(x+z) = x + yz + xz + yx = x + yz + xz$
 $\bar{x}_2 (x_3 + x_4 + x_3 x_4) = \bar{x}_2 (1 + 1) = \bar{x}_2$