

$$f(a,b,c,d) = (d(b + (\bar{b}\bar{c}))) + (\bar{d}(b + \bar{c})) \cdot (ac + \bar{a}\bar{c})$$

$$b + (\bar{b}\bar{c}) \xrightarrow[\substack{\text{distributiva} \\ x + yz = (x+y)(x+z)}]{\substack{x + \bar{x} = 1 \\ \downarrow}} (b + \bar{b})(b + \bar{c}) = (b + \bar{c}) \longrightarrow d(b + \bar{c}) + (\bar{d}(b + \bar{c})) = db + d\bar{c} + \bar{d}b + \bar{d}\bar{c} = b(d + \bar{d}) + \bar{c}(d + \bar{d}) = b + \bar{c}$$

$$f(a,b,c,d) = (b + \bar{c}) \cdot (ac + \bar{a}\bar{c}) = bac + \overset{x\bar{x}=0}{\bar{c}ac} + b\bar{a}\bar{c} + \bar{c}a\bar{c} \xrightarrow[\substack{\text{absorción} \\ xy + x = x}]{\substack{x \cdot x = x \\ \downarrow}} = abc + \bar{a}\bar{c} \longleftarrow \text{SOP}$$

$$f(a,b,c,d) = abc + \bar{a}\bar{c} \xrightarrow[\substack{\bar{\bar{x}} = x \\ \downarrow}]{\substack{\bar{\bar{x}} = x}} = \overline{\overline{abc + \bar{a}\bar{c}}} = \overline{\overline{abc} + \overline{\bar{a}\bar{c}}} \xrightarrow[\substack{\bar{\bar{x}} = x \\ \downarrow}]{\substack{\overline{(x \cdot y)} = \bar{x} + \bar{y} \text{ De Morgan} \\ \downarrow}} = \overline{\overline{a} + \overline{b} + \overline{c} + \overline{\bar{a}} + \overline{\bar{c}}} \xrightarrow[\substack{\bar{\bar{x}} = x \\ \downarrow}]{\substack{x + x = x \\ \downarrow}} = \overline{\overline{a} + \overline{b} + \overline{c} + a + c} \longleftarrow \text{NOR}$$

