Exercice 1

(a) $\bar{a}\bar{b}\bar{c} + \bar{a}b\bar{c} + a\bar{b}c + ab\bar{c}$

$\equiv \bar{a}(\bar{b}\bar{c} + b\bar{c}) + a(\bar{b}c + b\bar{c})$

$\equiv \bar{a}\bar{c} + a\bar{b}c + ab\bar{c}$ ✓

$(a + b + \bar{c}) \cdot (a + \bar{b} + \bar{c}) \cdot (\bar{a} + b + c) \cdot (\bar{a} + \bar{b} + \bar{b})$

(ii) $\bar{a}\bar{b}c + ab\bar{c} + abc$

$(a + b + c) \cdot (a + \bar{b} + c) \cdot (a + \bar{b} + \bar{c}) \cdot (\bar{a} + b + c) \cdot (\bar{a} + b + \bar{c})$

$$\bar{a} + ab + a\bar{c} + a\bar{b}\bar{c}$$

$$\bar{a}\overline{bc} + ab\bar{c} + a\bar{c}b + a\bar{b}\bar{c}$$
$$+ \bar{a}bc + abc + a\bar{c}b$$

$\equiv$

(b) (i) $\bar{a}c + \bar{a}b\bar{c} + abc$

$\bar{a}(\bar{b}c + bc + b\bar{c}) + abc$

$\equiv \bar{a}\bar{b}c + \bar{a}bc + \bar{a}b\bar{c} + abc$

$\equiv \bar{a}\bar{b}c + \bar{a}bc + \bar{a}b\bar{c} + abc$

abc
$\bar{a}\bar{b}c$
$\bar{a}bc$
$ab\bar{c}$

$\equiv (a+b+c)(\bar{a}+b+\bar{c})(\bar{a}+b+c)(\bar{a}+\bar{b}+c)$

(ii) $\bar{a}\bar{b}\bar{c}$
$+\bar{a}bc$
$+\bar{a}\bar{b}c$
$+\bar{a}b\bar{c}$

$+(a+a\bar{b})(b+\bar{c})$
$\equiv ab + a\bar{c} + a\bar{b}\bar{c}$

000
001
010
011
100
101

$\equiv \bar{a}\bar{b}\bar{c} + \bar{a}bc + \bar{a}\bar{b}c + \bar{a}b\bar{c}$ $+abc$
$+ab\bar{c}$
$+a\bar{b}\bar{c}$

$\equiv (\bar{a}+b+\bar{c})$

$$\bar{a} + a(a+\bar{b})(b+\bar{c})$$

$$\bar{a}\bar{b}c + \bar{a}b\bar{c} + a\bar{b}\bar{c} + abc$$

$$\equiv \overline{(a+b+\bar{c})(a+\bar{b}+c)(\bar{a}+b+c)(\bar{a}+\bar{b}+\bar{c})}$$

$$\equiv \overline{0 \cdot (a+b+\bar{c})}$$

$$\equiv \overline{(\bar{a}\bar{b}c)}\,\overline{(\bar{a}b\bar{c})}$$

$$\overline{(\bar{a}\bar{b}c)}\,\overline{(\bar{a}b\bar{c})}$$

a: 3
b: 2
1
c: 1/2

$$(ab + cd) + (a + \bar{b})(\bar{c} + d)$$

d: 3

$$\equiv ab + cd + a\bar{c} + ad + \bar{b}\bar{c} + \bar{b}d$$

$$\overline{(\overline{ab})(\overline{cd})(\ldots)(}$$

$$\equiv$$

$$\overline{\bar{a}bc + a\bar{b}\bar{c} + ab\bar{c} + abc}$$

$$\equiv \overline{(\bar{a}bc)}\,\overline{(a\bar{b}\bar{c})} + \overline{(ab\bar{c})} + \overline{(abc)}$$

$$\equiv (a + \bar{b} + \bar{c})(\bar{a} + b + c)(\bar{a} + \bar{b} + c)$$

$$+ (\bar{a} + \bar{b} + \bar{c})$$