CORRECTION EXERCICES

sur les simplifications algébriques

EXERCICE 1 :

Simplifiez les fonctions suivantes :

$F_1 = a.(a+b)$

$F_1 = a.a + a.b$

$F_1 = a + a.b$

$F_1 = a.(1+b)$

$F_1 = a.1$

$F_1 = a$

$F_2 = (a+b).(\overline{a}+b)$

$F_2 = a.\overline{a} + a.b + \overline{a}.b + b.b$

$F_2 = 0 + a.b + \overline{a}.b + b$

$F_2 = b.(1+\overline{a}+a)$

$F_2 = b$

$F_3 = a.b + \overline{c} + c.(\overline{a}+\overline{b})$

$F_3 = a.b + \overline{c} + \overline{a} + \overline{b}$

$F_3 = a + \overline{c} + \overline{a} + \overline{b}$

$F_3 = 1$

$F_4 = (x.\overline{y}+z).(x+\overline{y}).z$

$F_4 = (x.\overline{y}+z).(x.z+\overline{y}.z)$

$F_4 = x.\overline{y}.x.z + z.x.z + x.\overline{y}.\overline{y}.z + \overline{y}.z.z$

$F_4 = x.\overline{y}.z + x.z + x.\overline{y}.z + \overline{y}.z$

$F_4 = x.z + \overline{y}.z(1+x)$

$F_4 = x.z + \overline{y}.z$

$F_4 = (x+\overline{y}).z$

$$F_5 = (x+y).z + \overline{x}.(\overline{y}+z) + \overline{y}$$
$$F_5 = x.z + y.z + \overline{x}.\overline{y} + \overline{x}.z + \overline{y}$$
$$F_5 = (x+y+\overline{x}).z + \overline{y}.(1+\overline{x})$$
$$F_5 = z + \overline{y}$$

$$F_6 = (a+b+c).(\overline{a}+b+c) + a.b + b.c$$
$$F_6 = a.\overline{a} + a.b + a.c + \overline{a}.b + b.b + b.c + \overline{a}.c + b.c + c.c + a.b + b.c$$
$$F_6 = a.b + a.c + \overline{a}.b + b + b.c + \overline{a}.c + b.c + c + a.b + b.c$$
$$F_6 = (a+\overline{a}+1+c+c+a+c).b + (\overline{a}+1+a).c$$
$$F_6 = b + c$$

$$F_7 = a + a.b.c + \overline{a}.b.c + \overline{a}.b + a.d + a.\overline{d}$$
$$F_7 = a.(1+b.c+d+\overline{d}) + \overline{a}.(b.c+b)$$
$$F_7 = a + \overline{a}.(b.(c+1))$$
$$F_7 = a + \overline{a}.b$$
$$F_7 = a + b$$

$$F_8 = a + \overline{a}.b + \overline{a}.\overline{b}.c + \overline{a}.\overline{b}.\overline{c}.d + \overline{a}.\overline{b}.\overline{c}.\overline{d}.e$$
$$F_8 = a + \overline{a}\left(b + \overline{b}.\left(c + \overline{c}.\left(d + \overline{d}.e\right)\right)\right)$$
$$F_8 = a + b + c + d + e$$

$$F_9 = (a+b).(a+b.c) + \overline{a}.\overline{b} + \overline{a}.\overline{c}$$
$$F_9 = a.a + a.b.c + a.b + b.b.c + \overline{a}.\overline{b} + \overline{a}.\overline{c}$$
$$F_9 = a + a.b.c + a.b + b.c + \overline{a}.\overline{b} + \overline{a}.\overline{c}$$
$$F_9 = a.(1+b.c+b) + b.c + \overline{a}.\overline{b} + \overline{a}.\overline{c}$$
$$F_9 = a + b.c + \overline{a}.\overline{b} + \overline{a}.\overline{c}$$
$$F_9 = a + b.c + \overline{b} + \overline{c}$$
$$F_9 = a + c + \overline{b} + \overline{c}$$
$$F_9 = 1$$

Exercice 2 :

Simplifiez les fonctions suivantes :

$$F_1 = \overline{a}.b.c + a.c + (a+b).\overline{c}$$
$$F_1 = \overline{a}.b.c + a.(c+\overline{c}) + b.\overline{c}$$

$$F_1 = a + b.(c + \bar{c})$$
$$F_1 = a + b$$

$$F_2 = b.c + a.c + a.b + b$$
$$F_2 = a.c + b(1 + a + c)$$
$$F_2 = a.c + b$$

$$F_3 = (a.\bar{b} + c).(a + \bar{b}).c$$
$$F_3 = a.\bar{b}.c + a.c + .a.\bar{b}.c + \bar{b}.c$$
$$F_3 = a.c(\bar{b} + 1 + \bar{b}) + \bar{b}.c$$
$$F_3 = (a + \bar{b}).c$$

$$F_4 = (a.c + b.\bar{c}).(\bar{a} + \bar{c}).b$$
$$F_4 = \bar{a}.b.\bar{c} + b.\bar{c}$$
$$F_4 = b.\bar{c}$$

$$F_5 = (\bar{a}.b + a.\bar{b}) + (a.b + \bar{a}.\bar{b})$$
$$F_5 = 1$$

$$F_6 = a.b.c + a.b.\bar{c} + \bar{a}.b.\bar{c} + \bar{a}.b.c$$
$$F_6 = a.b.(c + \bar{c}) + \bar{a}.b.(\bar{c} + c)$$
$$F_6 = (a + \bar{a}).b = b$$
$$F_6 = b$$

$$F_7 = a.\bar{b}.\bar{c} + a.b.\bar{c} + a.b.c + a.b.\bar{c}$$
$$F_7 = a.\bar{b}.\bar{c} + a.b.(\bar{c} + c + \bar{c})$$
$$F_7 = a.(\bar{b}.\bar{c} + b) = a.(\bar{c} + b)$$
$$F_7 = a.(\bar{c} + b)$$

$$F_8 = b.d + c.d + \bar{c}.d + \bar{a}.b.\bar{c}.\bar{d} + a.b.\bar{c}$$
$$F_8 = (b + c + \bar{c}).d + (\bar{a}.\bar{d} + a).b.\bar{c}$$
$$F_8 = d + b.\bar{c} + a.b.\bar{c} = d + b.\bar{c}$$
$$F_8 = d + b.\bar{c}$$

$$F_9 = a.b.c + c.(a.\bar{b} + \bar{a}.b)$$
$$F_9 = a.b.c + a.\bar{b}.c + \bar{a}.b.c$$
$$F_9 = a.c.(b + \bar{b}) + \bar{a}.b.c$$
$$F_9 = (a + \bar{a}.b).c = (a + b).c$$
$$F_9 = (a + b).c$$

$$F10 = a.b.\overline{c} + b.(a + \overline{c}) + \overline{\overline{a} + b + \overline{a}.c}$$
$$F10 = a.b.\overline{c} + a.b + b.\overline{c} + a.\overline{b}.\overline{\overline{a}.c}$$
$$F10 = b.(a.\overline{c} + a + \overline{c}) + a.\overline{b}.(a + \overline{c})$$
$$F10 = a.b + b.\overline{c} + a.\overline{b} + a.\overline{b}.\overline{c}$$
$$F10 = a.(b + \overline{b} + \overline{b}.\overline{c}) + b.\overline{c} = a + b.\overline{c}$$
$$F10 = a + b.\overline{c}$$

Exercice 3 :

Complémentez et simplifiez les fonctions suivantes :

$$T = a.b + b.c + a.c$$
$$\overline{T} = \overline{a.b + b.c + a.c}$$
$$\overline{T} = (\overline{a} + \overline{b}).(\overline{b} + \overline{c}).(\overline{a} + \overline{c}) \text{ ou } \overline{T} = \overline{a}.\overline{b} + \overline{b}.\overline{c} + \overline{a}.\overline{c}$$

$$F = \overline{c}.\overline{d} + \overline{a}.\overline{b} + c.\overline{d} + a.\overline{b}$$
$$\overline{F} = \overline{\overline{c}.\overline{d} + \overline{a}.\overline{b} + c.\overline{d} + a.\overline{b}}$$
$$\overline{F} = (c + d).(a + b).(\overline{c} + d).(\overline{a} + b)$$
$$\overline{F} = ((a.\overline{a}) + b).((c.\overline{c}) + d)$$
$$\overline{F} = b.d$$

$$G = \overline{a}.\overline{b} + a.b + a.\overline{b}$$
$$\overline{G} = \overline{\overline{a}.\overline{b} + a.b + a.\overline{b}}$$
$$\overline{G} = (a + b).(\overline{a} + \overline{b}).(\overline{a} + b)$$
$$\overline{G} = (a + b).(\overline{a} + (\overline{b}.b))$$
$$\overline{G} = (a + b).\overline{a} = \overline{a}.b$$

$$H = \overline{c}.d + \overline{a}.b + c.d + a.b$$
$$\overline{H} = \overline{\overline{c}.d + \overline{a}.b + c.d + a.b}$$
$$\overline{H} = (c + \overline{d}).(a + \overline{b}).(\overline{c} + \overline{d}).(\overline{a} + \overline{b})$$
$$\overline{H} = ((\overline{a}.a) + \overline{b}).((c.\overline{c}) + \overline{d})$$
$$\overline{H} = \overline{b}.\overline{d}$$