## EXERCICE 1 :

**Simplifiez les fonctions suivantes :**

$$F_1 = a.(a+b)$$
$$F_2 = (a+b).(\overline{a}+b)$$
$$F_3 = a.b+\overline{c}+c.(\overline{a}+\overline{b})$$
$$F_4 = (x.\overline{y}+z).(x+\overline{y}).z$$
$$F_5 = (x+y).z+\overline{x}.(\overline{y}+z)+\overline{y}$$
$$F_6 = (a+b+c).(\overline{a}+b+c)+a.b+b.c$$
$$F_7 = a+a.b.c+\overline{a}.b.c+\overline{a}.b+a.d+a.\overline{d}$$
$$F_8 = a+\overline{a}.b+\overline{a}.\overline{b}.c+\overline{a}.\overline{b}.\overline{c}.d+\overline{a}.\overline{b}.\overline{c}.\overline{d}.e$$
$$F_9 = (a+b).(a+b.c)+\overline{a}.\overline{b}+\overline{a}.\overline{c}$$

## SOLUTION EXERCICE 1 :

$$F_1 = a.(a+b)$$
$$F_1 = a.a+a.b$$
$$F_1 = a+a.b$$
$$F_1 = a.(1+b)$$
$$F_1 = a.1$$
$$F_1 = a$$

$$F_2 = (a+b).(\bar{a}+b)$$
$$F_2 = a.\bar{a} + a.b + \bar{a}.b + b.b$$
$$F_2 = 0 + a.b + \bar{a}.b + b$$
$$F_2 = b.(1+\bar{a}+a)$$
$$F_2 = b$$

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

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

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

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

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

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

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