

ITI1500

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Solutions Devoir # 2

Question 2.3 :

(a) $xyz + x'y + xyz' = xy + x'y = \mathbf{y}$

(b) $x'yz + xz = (x'y + x)z = z(x + x')(x + y) = \mathbf{z(x + y)}$

(c) $(x + y)'(x' + y') = x'y'(x' + y') = \mathbf{x'y'}$

(d) $xy + x(wz + wz') = x(y + wz + wz') = \mathbf{x(w + y)}$

(e) $(yz' + x'w)(xy' + zw') = yz'xy' + yz'zw' + x'wxy' + x'wzw' = \mathbf{0}$

(f) $(x + y' + z')(x' + z') = xx' + xz' + x'y' + y'z' + x'z' + z'z' = z' + y'(x' + z') = \mathbf{z' + x'y'}$

Question 2.4 :

(a) $x'z' + xyz + xz' = z' + xyz = (z + z')(z' + xy) = \mathbf{xy + z'}$

(b) $(x'y' + z)' + z + xy + wz = (x'y')'z' + z + xy + wz$
 $= [(x + y)z' + z] + xy + wz$
 $= (z + z')(z + x + y) + xy + wz$
 $= z + wz + x + xy + y$
 $= z(I + w) + x(I + y) + y$
 $= \mathbf{x + y + z}$

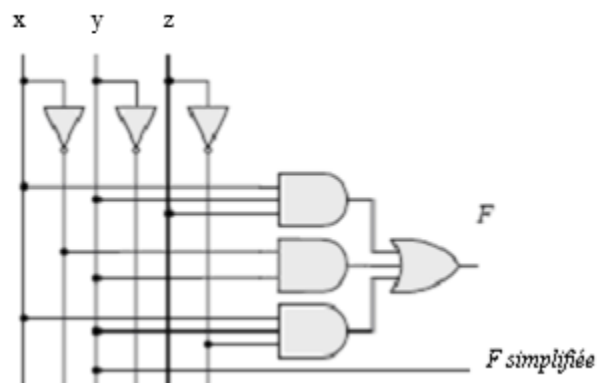
(c) $w'x(z' + y'z) + x(w + w'yz) = w'x(z' + y') + x(w + yz)$ (A noter que : $x + x'y = x + y$)
 $= w'xz' + w'xy' + xw + xyz$
 $= x(w'z' + w'y' + w + yz)$
 $= x(w'z' + y' + w + yz)$
 $= x(y' + z' + w + yz)$
 $= x(y' + z + z' + w) = x(y' + I + w) = \mathbf{x}$

$$\begin{aligned}
 (d) \quad (w' + y)(w' + y')(w + x + y'z) &= (w' + w'y' + w'y)(w + x + y'z) \\
 &= (w' + w')(w + x + y'z) \\
 &= w'(w + x + y'z) \\
 &= w'x + w'y'z \\
 &= \mathbf{w'(x + y'z)}
 \end{aligned}$$

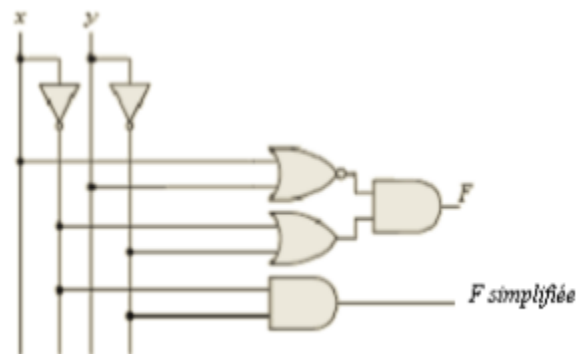
$$\begin{aligned}
 (e) \quad wxy'z + w'xz + wxyz &= wxz(y' + y) + w'xz \\
 &= wxz + w'xz \\
 &= xz(w + w') = \mathbf{xz}
 \end{aligned}$$

Question 2.6 :

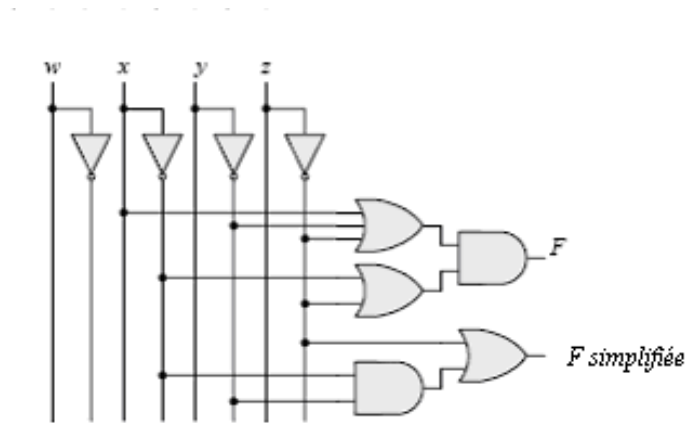
Circuit pour l'équation de l'exercice 2.3-a :



Circuit pour l'équation de l'exercice 2.3-c :

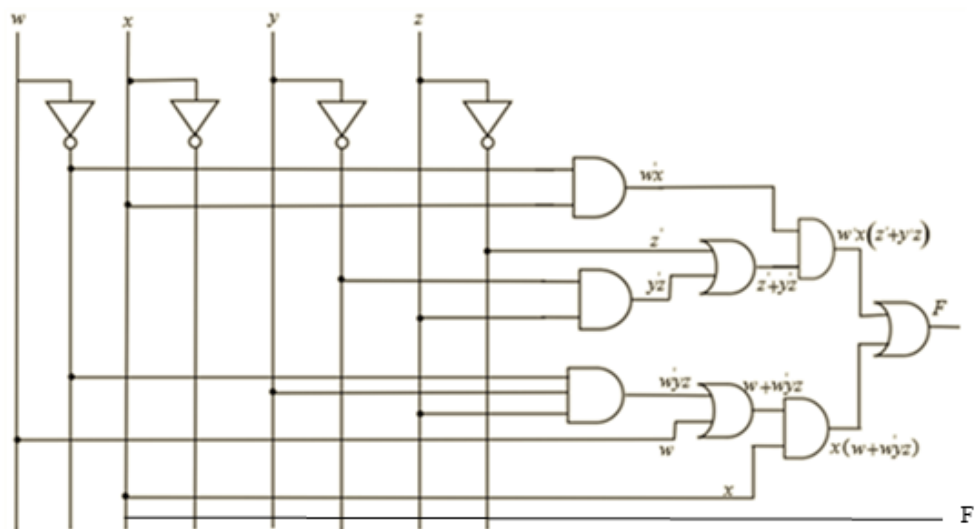


Circuit pour l'équation de l'exercice 2.3-f :



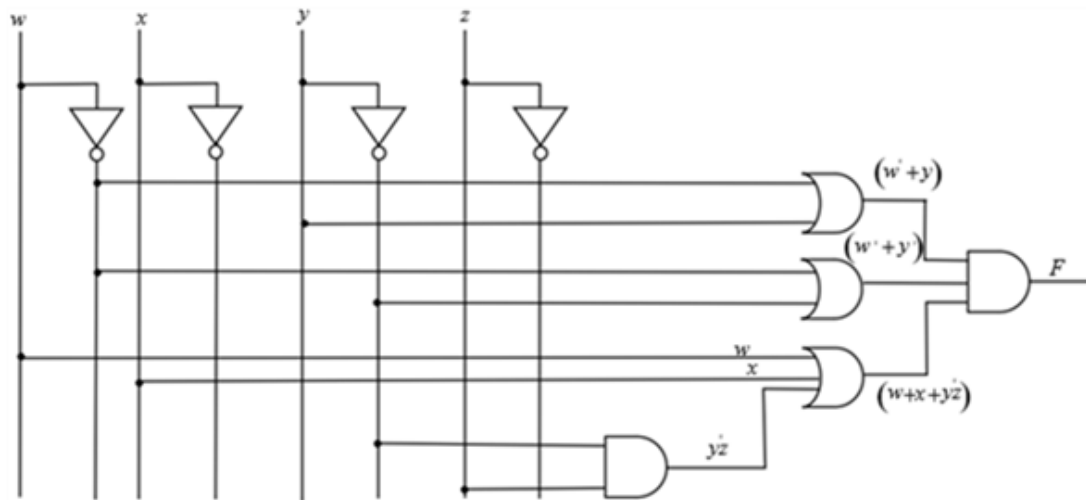
Question 2.7 :

Circuit pour l'équation de l'exercice 2.4-c :

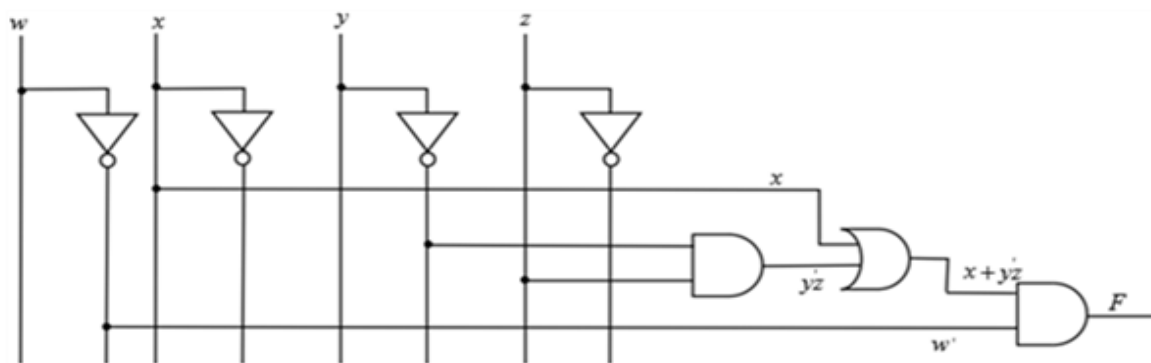


Circuit pour l'équation de l'exercice 2.4-d :

Pour la fonction originale :

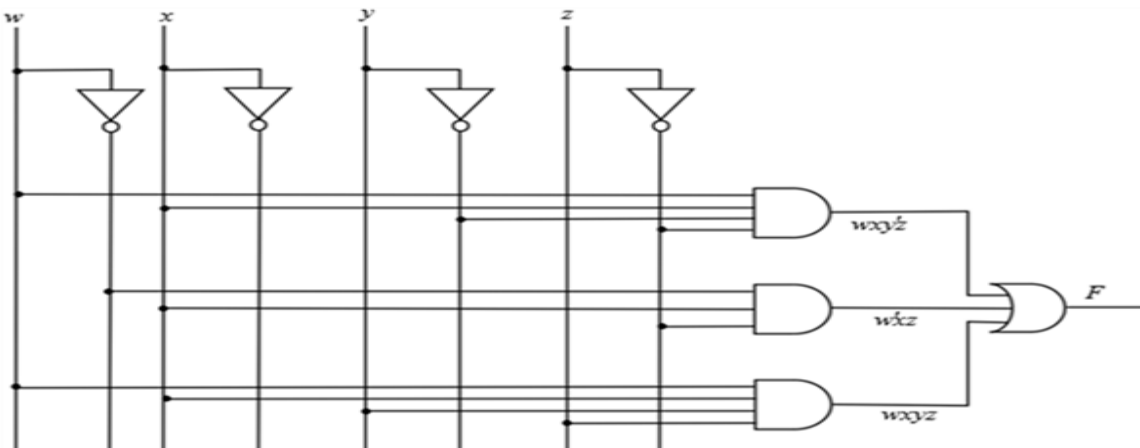


Pour la fonction simplifiée :

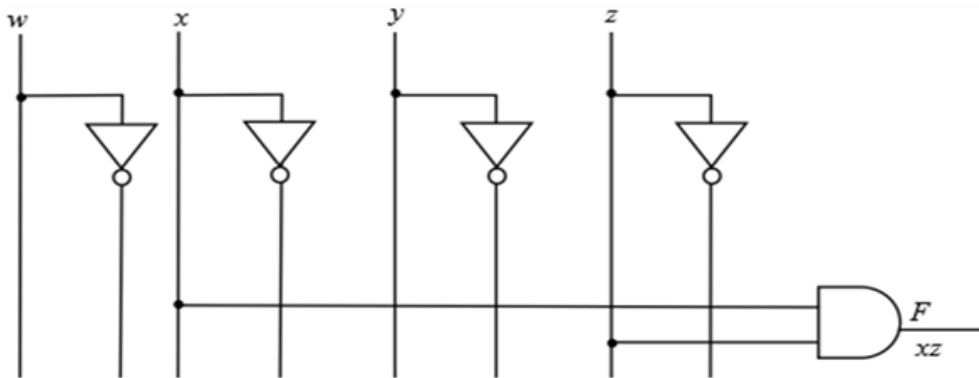


Circuit pour l'équation de l'exercice 2.4-e :

Pour la fonction originale :



Pour la fonction simplifiée :



Question 2.11 :

(a) $F = xy + xy' + y'z$

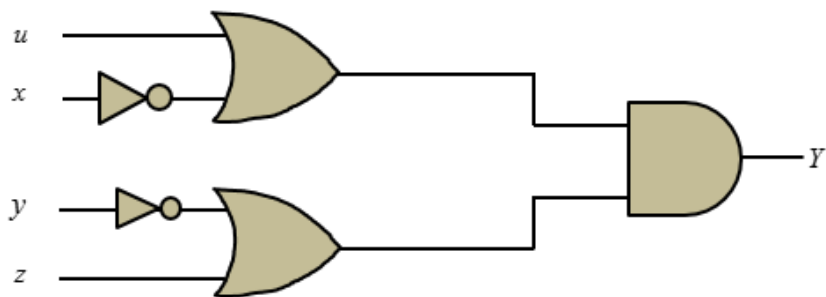
x	y	z	y'	xy	xy'	$y'z$	$F = xy + xy' + y'z$
0	0	0	1	0	0	0	0
0	0	1	1	0	0	1	1
0	1	0	0	0	0	0	0
0	1	1	0	0	0	0	0
1	0	0	1	0	1	0	1
1	0	1	1	0	1	1	1
1	1	0	0	1	0	0	1
1	1	1	0	1	0	0	1

(b) $F = ac + b'c'$

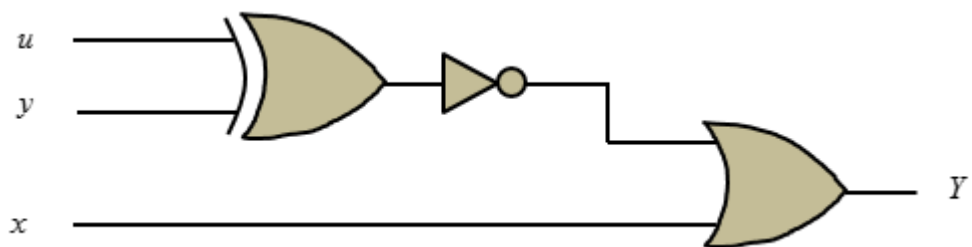
a	b	c	ac	$b'c'$	F
0	0	0	0	1	1
0	0	1	0	0	0
0	1	0	0	0	0
0	1	1	0	0	0
1	0	0	0	1	1
1	0	1	1	0	1
1	1	0	0	0	0
1	1	1	1	0	1

Question 2.13 :

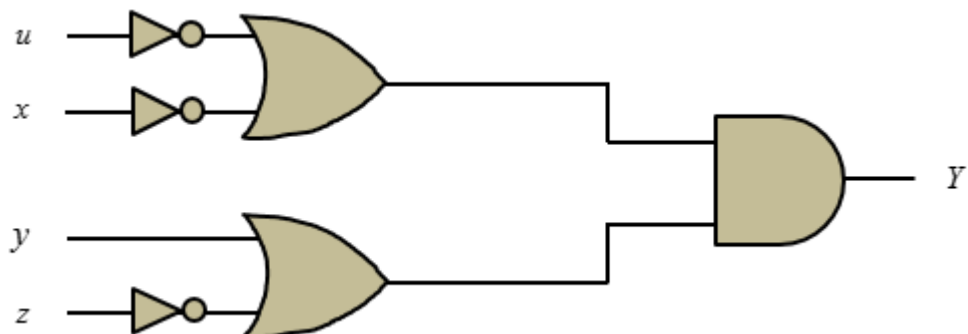
a) $F = (u + x')(y' + z)$



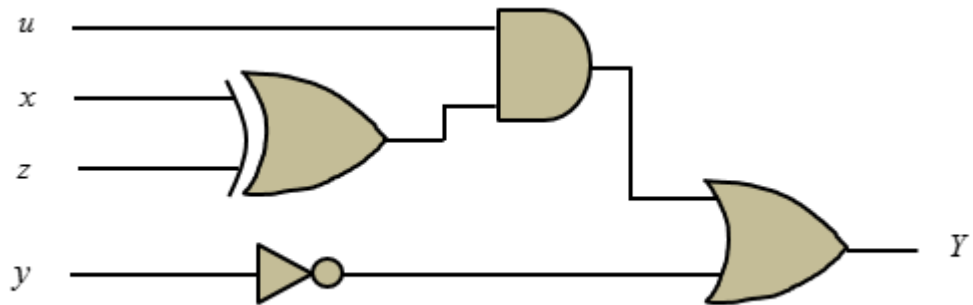
b) $F = (u \oplus y)' + x$



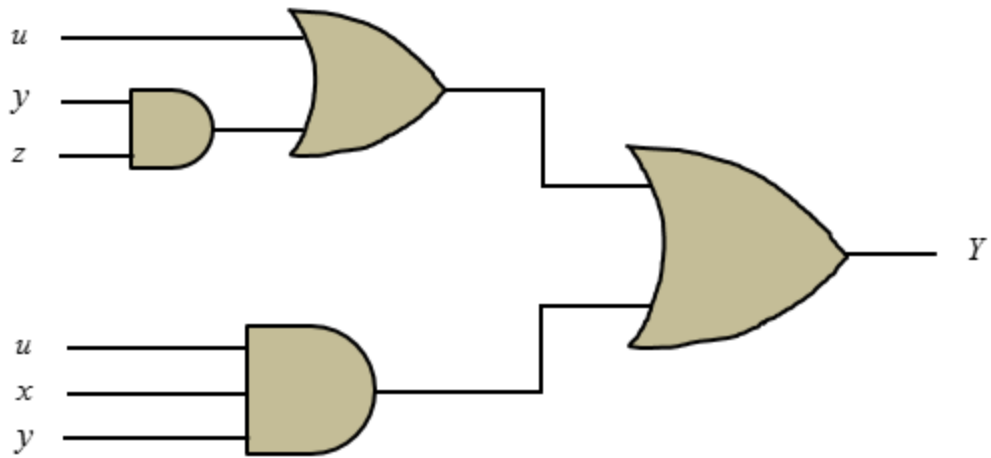
c) $F = (u' + x')(y + z')$



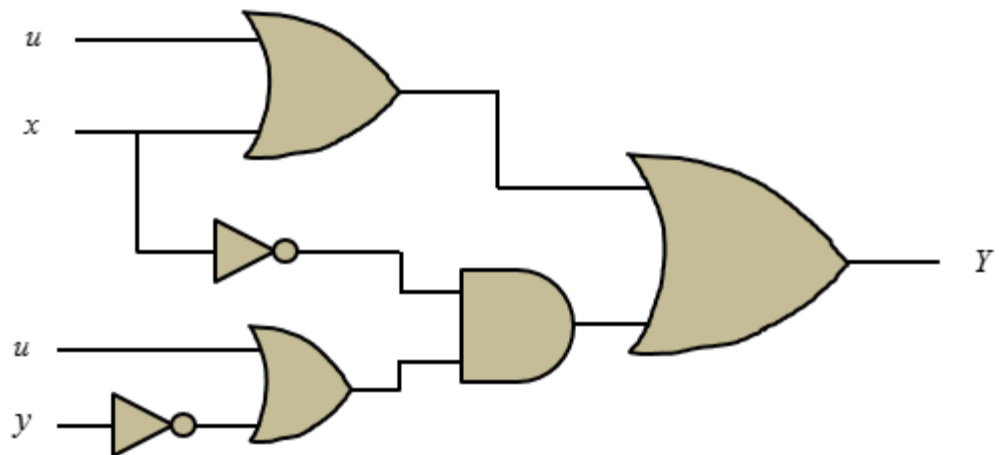
d) $F = u(x \oplus z) + y'$



e) $F = u + yz + uxy$

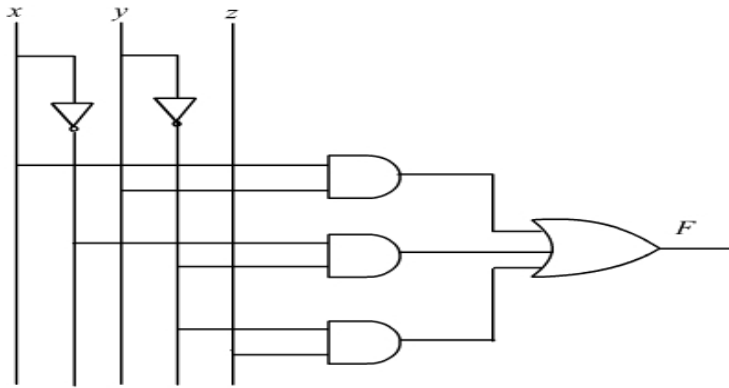


f) $F = u + x + x'(u + y')$

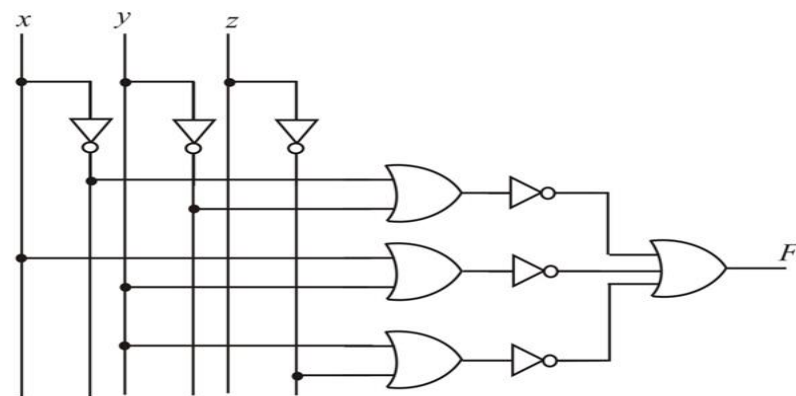


Question 2.14 :

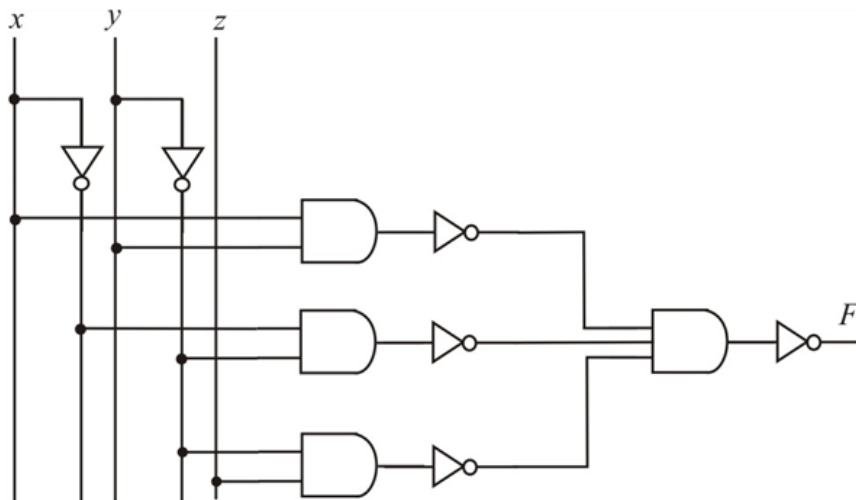
a) $F = xy + x'y' + y'z$



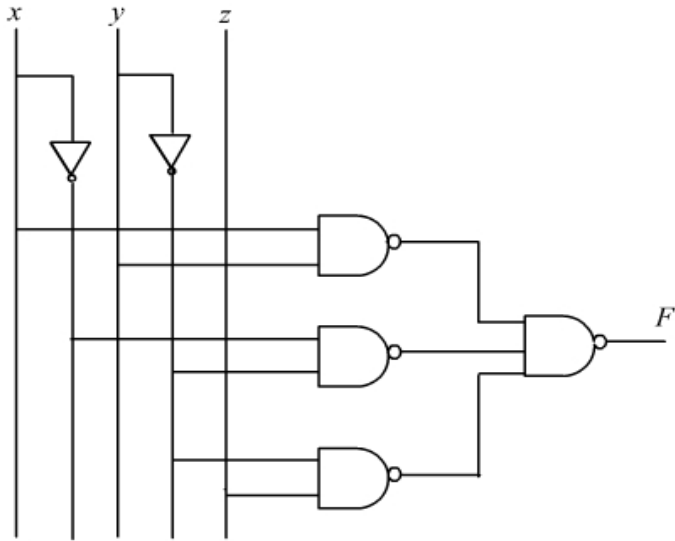
b) $F = (x' + y')' + (x + y)' + (y + z)'$



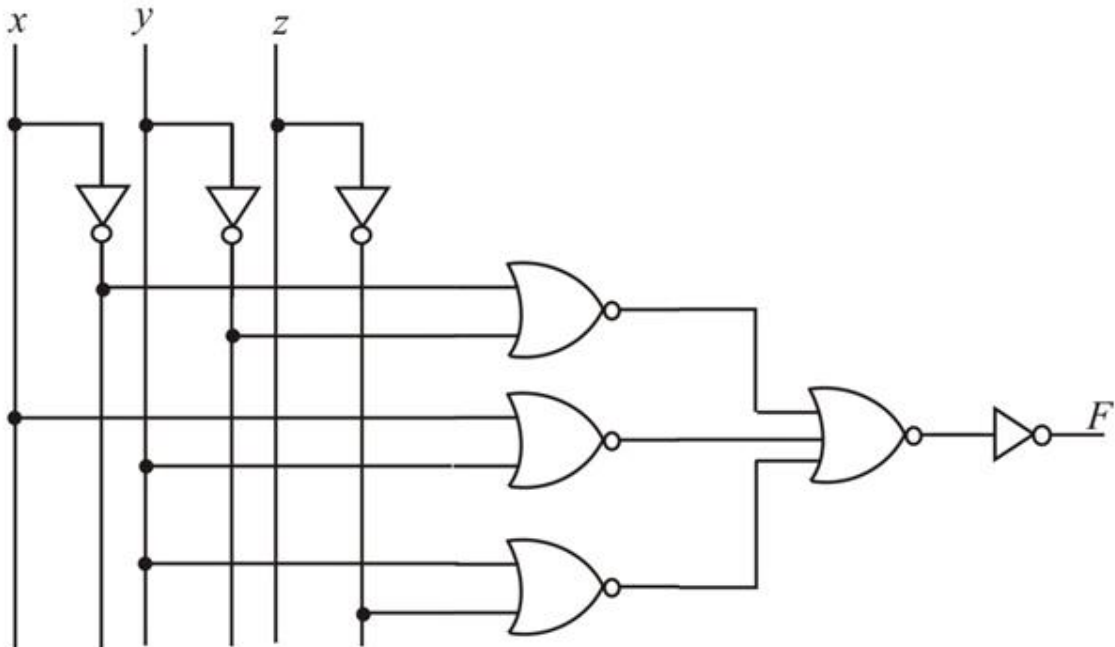
c) $F = ((xy)' (x'y')' (y'z)')'$



d) $F = ((xy)' (x'y')' (y'z)')'$



e) $F = [((x' + y')' + (x+y)' + (y+z')')']'$

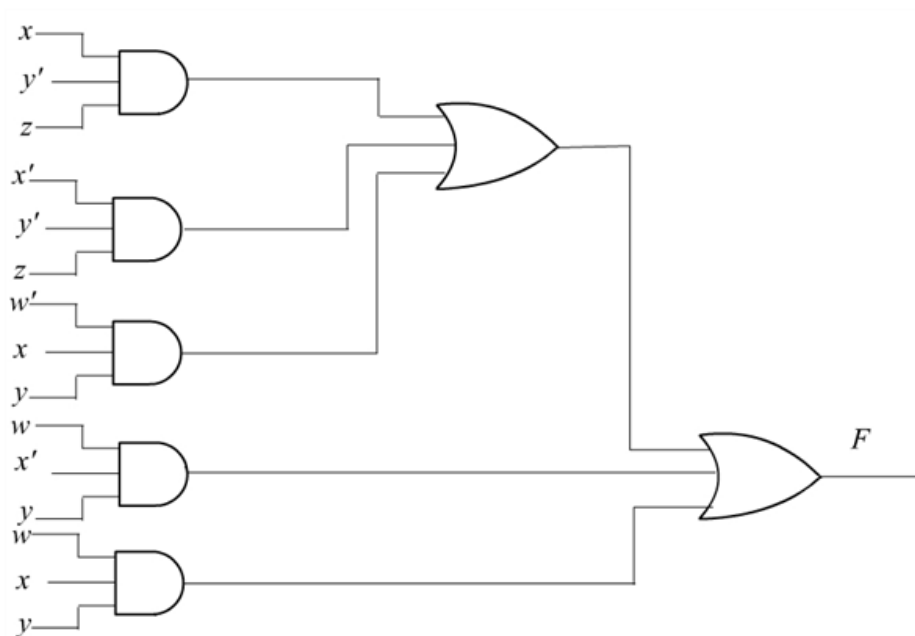


Question 2.18 :

a)

w	x	y	z	F
0	0	0	0	0
0	0	0	1	1
0	0	1	0	0
0	0	1	1	0
0	1	0	0	0
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	0
1	0	0	1	1
1	0	1	0	1
1	0	1	1	1
1	1	0	0	0
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1

b)



c)

$$\begin{aligned}
 F &= xy'z + x'y'z + w'xy + wx'y + wxy \\
 &= y'z(x + x') + xy(w + w') + wx'y \\
 &= y'z + xy + wx'y \\
 &= y'z + y(x + wx') \\
 &= y'z + y(x + w)(x + x') \\
 &= y'z + y(x + w) \\
 F &= y'z + xy + wy
 \end{aligned}$$

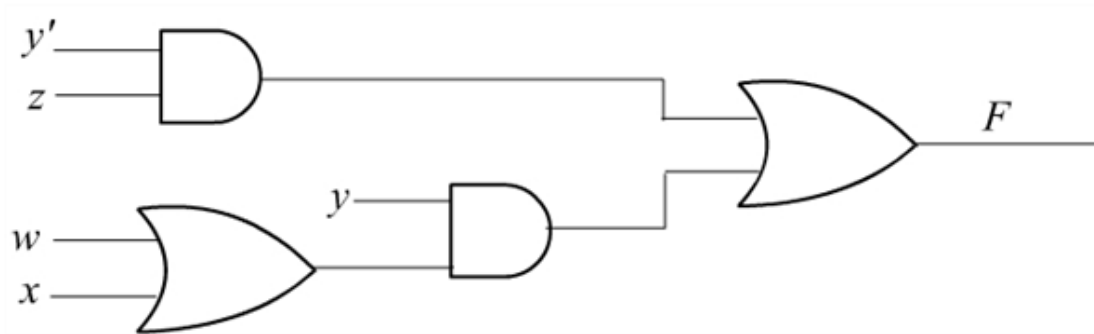
Donc $F = y'z + y(w + x)$

d)

$$F = \Sigma(1, 5, 6, 7, 9, 10, 11, 13, 14, 15).$$

w	x	y	z	F
0	0	0	0	0
0	0	0	1	1
0	0	1	0	0
0	0	1	1	0
0	1	0	0	0
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	0
1	0	0	1	1
1	0	1	0	1
1	0	1	1	1
1	1	0	0	0
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1

e)



Le circuit de l'expression simplifiée a 3 portes 'ET' de moins que le circuit de la fonction originale.