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Question 2-3

a) $xyz + x'y + xyz'$

$f(x,y,z) = xyz + x'y + xyz'$

$= xy(z+z') + x'y$

$= xy + x'y$

$\boxed{f(x,y,z) = y}$ car $\{x + x' = 1\}$

b) $x'yz + xz$.

$\Rightarrow z(x'y + x)$ (distributive)

$= z\underbrace{(x'+x)}_{1}(x+y)$

$= z(x+y)$

$\boxed{b = zx + yz}$

c) $(x+y)'(x'+y') = x'y'(x'+y')$ (De Morgan)

$= x'y'x' + x'y'y'$ (de base) $x+x = x$

$= x'y' + x'y'$ (de base $x+x = x$

$$\boxed{(x+y)'(x'+y') = x'y'}$$

d) $xy + x(wz + wz') = xy + x(w\underbrace{(z+z')}_{1})$ (Distributive)

$= xy + xw$ (Distributive)

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

e) $(yz' + x'w)(xy' + zw') = (yz')(xy') + (yz')(zw') + (x'w)(xy') + (x'w)(zw')$

$= (yy')(z'x) + (z'z)(yw') + (x'x)(wy') + (ww')(x'z)$

$\boxed{(yz' + x'w)(xy' + zw') = 0}$ (de base $x.x' = 0$)

f) $(x' + z')(x + y' + z') = \underbrace{x'x}_{0} + x'y' + x'z' + z'x + z'y' + \underbrace{z'z'}_{z'}$

$= x'y' + z'(x + x') + z'y' + z'$ (de base $x + x' = 1$

$= y'(x' + z') + z' + z'$ (associative)

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

$= z' + y'z' + y'x'$ (Associative)

$= (z' + y'z') + (y'x')$ (Absoption)

$\boxed{(x' + z')(x + y' + z') = z' + x'y'}$

Question 2-4

a) $x'z' + xyz + xz' = z'(x' + x) + xyz$ (de base

$= z' + xyz$

$= \underbrace{(z' + z)}_{1}(z' + xy)$ (Assotiative)

$=$

$\boxed{x'z' + xyz + xz' = z' + xy}$

b) $(x'y'+z)' + z + xy + wz = (\cancel{x'y'})((x+y)'+z)' + z + xy + wz$

$= (\cancel{x'y'})\,(x+y)z' + z + xy + wz$

$= z'x + z'y + z + xy + wz.$

$= (z+z')(z+x+y) + xy + wz$

$= z + wz + x + xy + y$

$= z(1+w) + x + y(1+x)$

$$\boxed{((x'y')+z)' + z + xy + wz = z + x + y}$$

c) $w'x(z'+y'z) + x(w+w'yz) = w'x((z'+y')(z'+z)) + x((w+yz)+\cancel{w'}+w$

$= w'x(z'+y') + x(w+yz)$

$= x(w'(z'+y') + (w+y\cancel{z}))$ (Distributiv

$= x(w'z'+w'y' + w+yz)$

$= x(w'z' + (w+y')(w+w') + yz)$ (de bas

$= x(w'z' + w + y' + yz)$ (de base)

$= x(w + z' + y + y')$ (de base)

$= x(w + z' + 1)$

$$\boxed{w'x(z'+y'z) + x(w+w'yz) = x}$$ (par absorption)

d) $(w'+y)(w'+y')(w+x+y'z) = (w'+yy')(xw+x+y'z)$ (Associative

$= w'(w+x+y'+z)$ de base $yy'=0$

$= w'w + w'x + w'y'z$

$= w'x + w'y'z$ (Distributive)

$$\boxed{(w'+y)(w'+y')(w+x+y'z) = w'(x+y'z)}$$

e) $wxy'z + w'xz + wxyz = wxz(y'+y) + w'xz$ (Associative)

$= wxz + w'xz$

$= xz(w+w')$ de base $w+w'=1$

$$\boxed{wxy'z + w'xz + wxyz = xz}$$

Question 2-11

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

x	y	z	y'	xy	xy'	$y'z$	F
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

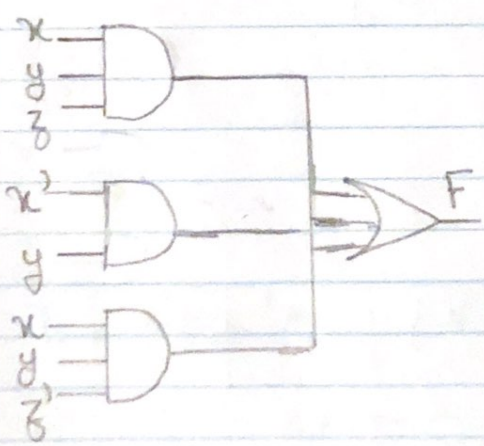
b) $F = ac + b'c'$.

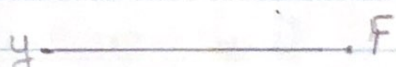
a	b	c	b'	c'	ac	b'c'	F
0	0	0	1	1	0	1	1
0	0	1	1	0	0	0	0
0	1	0	0	1	0	0	0
0	1	1	0	0	0	0	0
1	0	0	1	1	0	1	1
1	0	1	1	0	1	0	1
1	1	0	0	1	0	0	0
1	1	1	0	0	1	0	1

Question 2-6

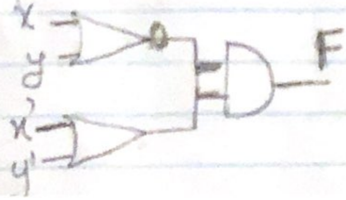
Dessiner les circuits logiques qui implément les expressions originales et simplifiée de 2-3 :

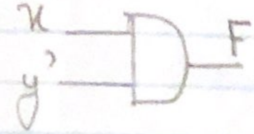
a) $xyz + x'y + xyz'$ $\qquad F = y$





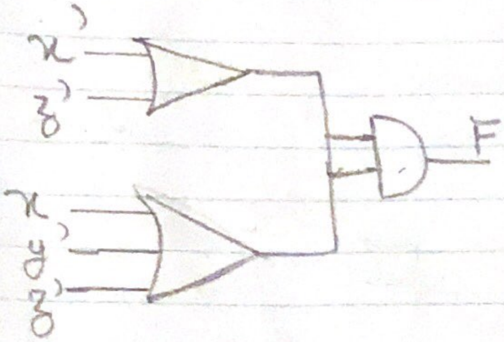
b) $(x+y)'(x'+y')$ $\qquad F = x'y'$

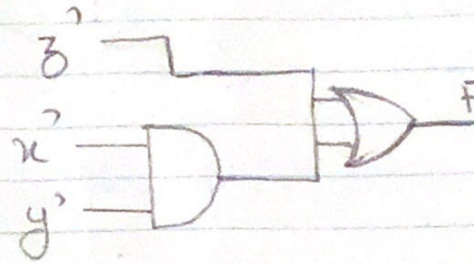




f) $(x'+z')(x+y'+z')$

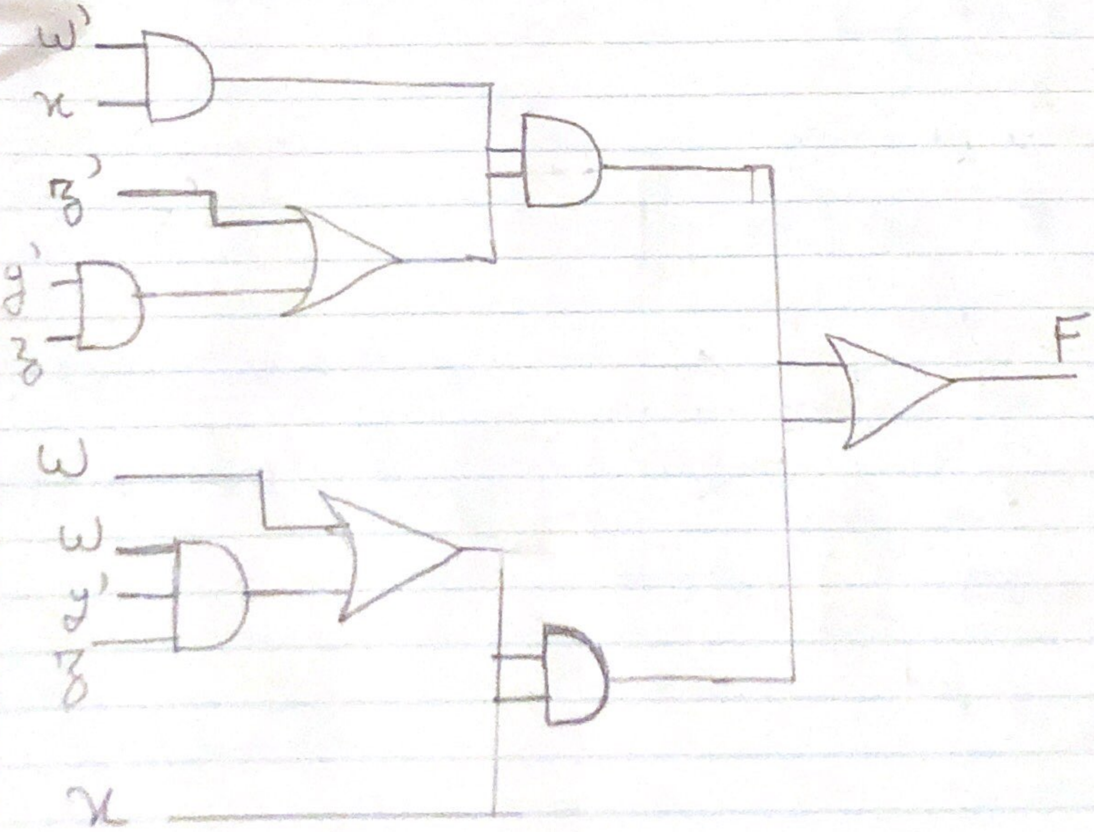
$F = z' + x'y'$





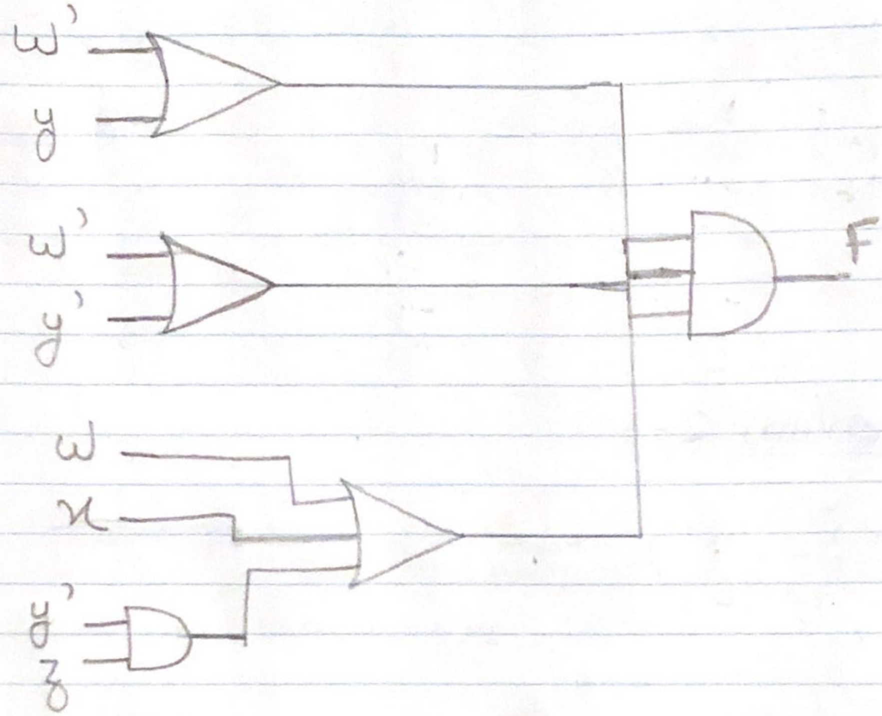
Question 2-7

2-4) c) $w'x(z'+y'z) + x(w+w'yz)$

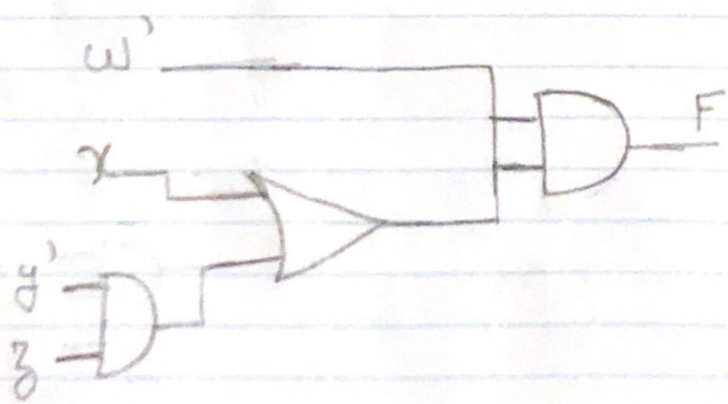


$F = x$

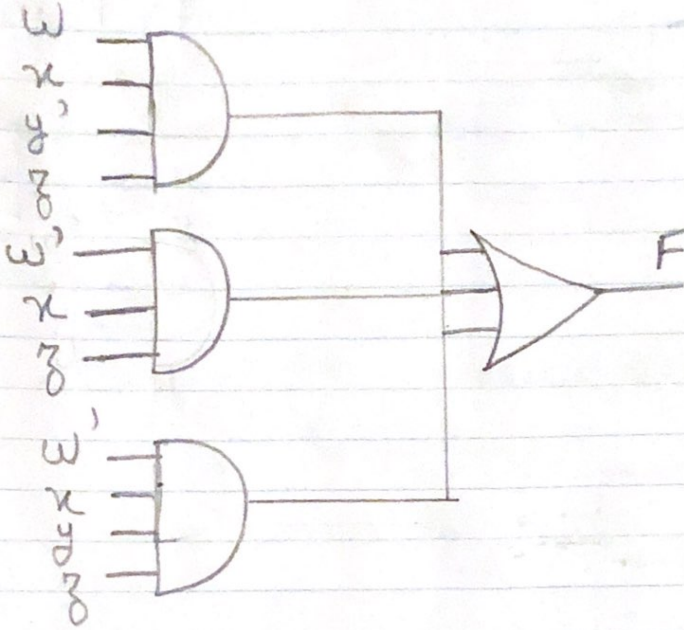
2-4) d) $(w'+y)(w'+y')(w+x+y'z)$



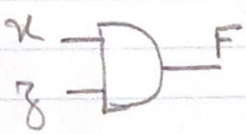
$F = w'(x+y'z)$



2-4) e) $wxy'z + w'xz + wxyz$

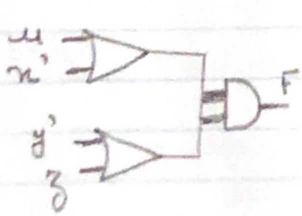


$F = xz$

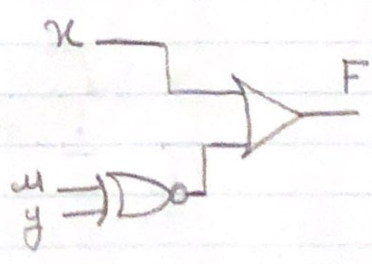


Questions 2-13

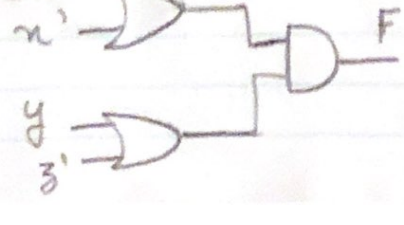
a) $F = (u+x')(y'+z)$



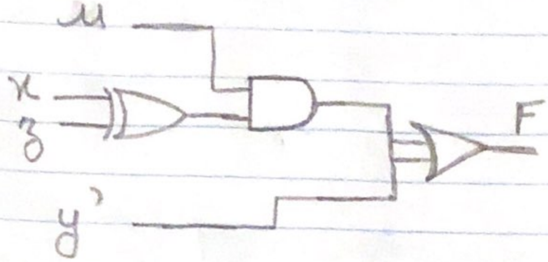
b) $F = (u \oplus y)' + x$



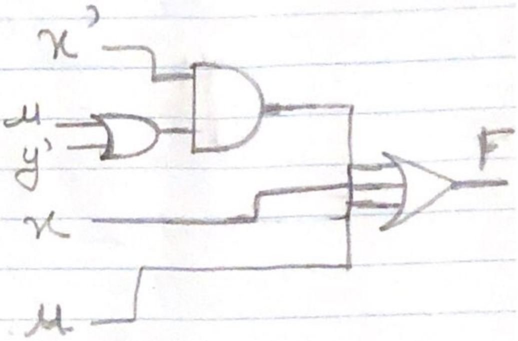
c) $F = (u'+x')(y+z')$



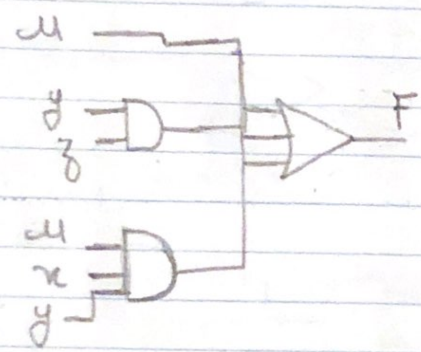
d) $F = w(x \oplus z) + y'$



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



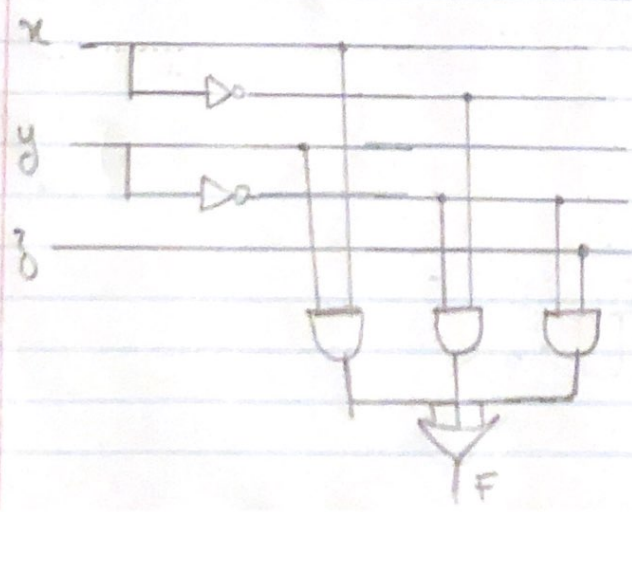
e) $F = w + yz + wxy$



Question 2-14

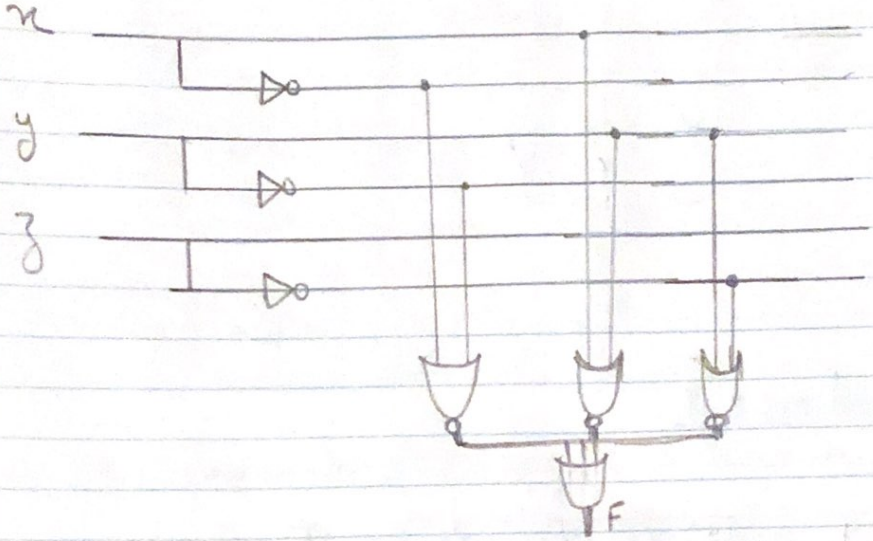
$F = xy + x'y' + y'z$

a)



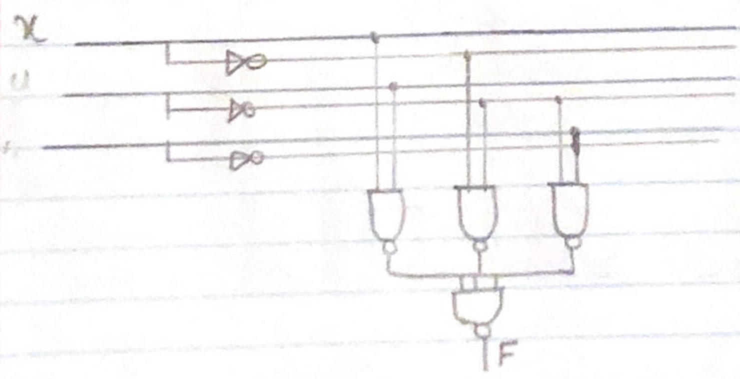
b) en utilisant les lois pour supprimer les ET $\Rightarrow F = (x'+y')' + (x+y)' + (y+z')'$

(17) et (9)



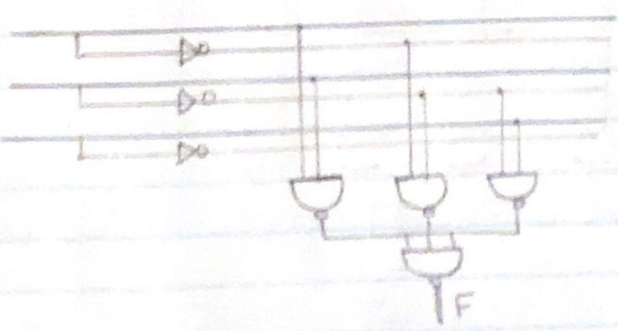
$$F = \begin{cases} xy = (x'+y')' \\ + \\ x'y' = (x+y)' \\ y'z = (y+z')' \end{cases}$$

c) En utilisant les lois on obtient $\Rightarrow F = ((xy)'(x'y')'(y'z)')'$



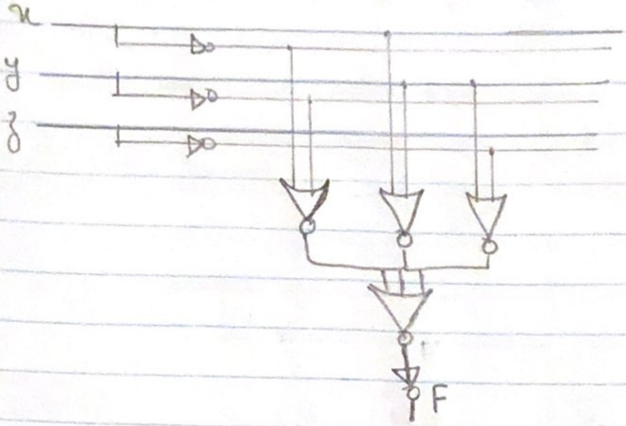
$$F = \begin{cases} (xy + x'y' + y'z)'' \quad (16) \\ ((xy)'(x'y')'(y'z)')' \end{cases}$$

d) En utilisant les lois on obtient $F = [((xy)'(x'y')'(y'z)')'']'$



$$F = \begin{cases} (xy + x'y' + y'z)'' \quad (16) \\ ((xy)'(x'y')'(y'z)')' \quad (9) \\ ((xy)'(x'y')'(y'z)')'' \end{cases}$$

c) En utilisant Non-OU et (Non) $F = [((x'+y')' + (x+y)' + (y+z')')']'$

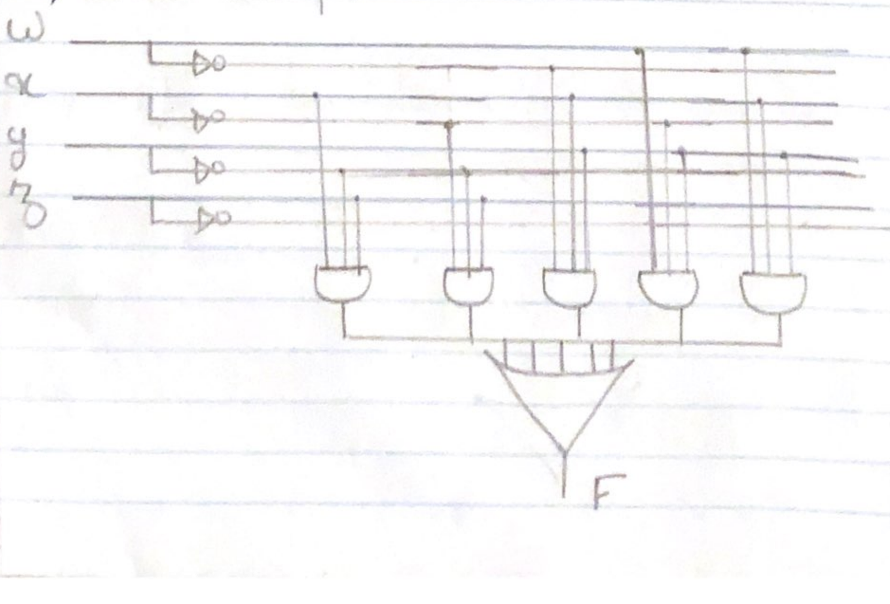


Question 2-18

a) table de vérité de $F = xy'z + x'y'z + w'xy + wx'y + wxy$

w	x	y	z	xy'z	x'y'z	w'xy	wx'y	wxy	F
0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	1	0	0	0	1
0	0	1	0	0	0	0	0	0	0
0	0	1	1	0	0	0	0	0	0
0	1	0	0	0	0	0	0	0	0
0	1	0	1	1	0	0	0	0	1
0	1	1	0	0	0	1	0	0	1
0	1	1	1	0	0	1	0	0	1
1	0	0	0	0	0	0	0	0	0
1	0	0	1	0	1	0	0	0	1
1	0	1	0	0	0	0	1	0	1
1	0	1	1	0	0	0	1	0	1
1	1	0	0	0	0	0	0	0	0
1	1	0	1	1	0	0	0	0	1
1	1	1	0	0	0	0	0	1	1
1	1	1	1	0	0	0	0	1	1

b) Circuit de f.



c) $F = xy'z + x'y'z + w'xy + wx'y + wxy$

$= xy(w'+w) + z(xy'+x'y') + wx'y \quad \}$ ③, ⑭

$= xy + zy' + wx'y$ (14)

$= y(wx'+x) + zy'$ (15)

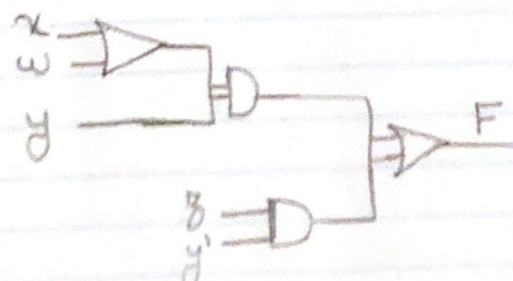
$$\boxed{F = y(x+w) + zy'}$$

d) Table de vérité de $F = y(x+w) + zy'$

w	x	y	z	x+w	y(x+w)	zy'	F
0	0	0	0	0	0	0	0
0	0	0	1	0	0	1	1
0	0	1	0	0	0	0	0
0	0	1	1	0	0	0	0
0	1	0	0	1	0	0	0
0	1	0	1	1	0	1	1
0	1	1	0	1	1	0	1
0	1	1	1	1	1	0	1
1	0	0	0	1	0	0	0
1	0	0	1	1	0	1	1
1	0	1	0	1	1	0	1
1	0	1	1	1	1	0	1
1	1	0	0	1	0	0	0
1	1	0	1	1	0	1	1
1	1	1	0	1	1	0	1
1	1	1	1	1	1	0	1

La table de vérité en (d) correspont à celle en (a) : ce sont les mêmes.

e)



* Le ~~expression~~ circuit simplifiée à 3 portes "Et" de moins et est plus lisible facilement que le circuit en(b).