Ejercicios Álgebra Book Pt. 2

2.15

$63 = 00111111 = m_2+m_3+m_4+m_5+m_6+m_7 = x^*yz^* + x^*yz + xy^*z^* + xy^*z + xyz^* + xyz$ FDC

$= M_0 M_1 = \cancel{xyz}\,(x+y+z)(x+y+z^*)$ FCC

$z \backslash xy$	00	01	11	10
0		1	1	1
1		1	1	1

y, x son los implicantes primos

Forma reducida : $x + y$

		m_2	m_3	m_4	m_5	m_6	m_7
A	x	$\cancel{X}$		X	X	X	X
B	y	X	X			X	X

$m_2, m_3 \equiv B$
$m_4, m_5 \equiv A$
$m_6, m_7 \equiv A+B$

Forma no simplificable $= A+B = x+y$

$82 = 01010010 = m_1+m_3+m_6 = x^*y^*z + x^*yz + xyz^*$ FDC

$= M_0M_2M_4M_5M_7 = (x+y+z)(x+y^*+z)(x^*+y+z)(x^*+y+z^*)(x^*+y^*+z^*)$ FCC

x^*	x^*y^*z	x^*z
x^*	x^*yz	
	xyz^*	

$\rightarrow x^*z,\ xyz^*$ implicantes primos

Forma reducida $= x^*z + xyz^*$

		m_1	m_3	m_6
A	x^*z	X	X	
B	xyz^*			X

$m_1, m_3 \equiv A$
$m_6 \equiv B$
$\rightarrow$ Forma no simplificable $= A + B = x^*z + xyz^*$

$103 = 0110\ 0111 = m_1+m_2+m_5+m_6+m_7 = x^*y^*z + x^*yz^* + xy^*z + xyz^* + xyz$ FDC

$= M_0M_3M_4 = (x+y+z)(x+y^*+z^*)(x^*+y+z)$ FCC $= (x + xy^* + xz^* + xy + yz^* + xz + y^*z)(x^*+y+z)$

$= (x + yz^* + y^*z)(x^*+y+z) = (xy + xz + \cancel{x^*yz^*} + yz^* + \cancel{x^*y^*z} + y^*z) = xy + \cancel{xz} + yz^* + y^*z$

Forma reducida   Implicantes primos

		m_1	m_2	m_5	m_6	m_7
A	xy				X	X
B	yz^*		X		X	
C	y^*z	X		X		

$m_1, m_5 \equiv C$
$m_2 \equiv B$
$m_6 \equiv A+B$
$m_7 \equiv A$

Forma ~~reducida~~ irreducible: $A+B+C = xy + yz^* + y^*z$

2.16 $13244 = 0011\ 0011\ 1011\ 1100$

$= m_2 + m_3 + m_6 + m_7 + m_8 + m_{10} + m_{11} + m_{12} + m_{13} = x^*y^*zt^* + x^*y^*zt + x^*y^*zt^* + x^*yzt + xy^*z^*t^* + xy^*zt^*$

$+ xy^*zt + xyz^*t^* + xyz^*t$ FDC

$= M_0 M_1 M_4 M_5 M_9 M_{14} M_{15} = (x+y+z+t)(x+y+z+t^*)(x+y^*+z+t)(x+y^*+z+t^*)(x^*+y+z+t^*)(x^*+y^*+z^*+t)(x^*+y^*+z^*+t^*)$

zt \ xy	00	01	11	10
00			1	1
01			1	
11	1	1		1
10	1	1		1

x^*z
y^*z
xyz^*
xz^*t^*
xy^*t^*

$x^*z + y^*z + xyz^* + xz^*t^* + xy^*t^*$ = Forma reducida

		m_2	m_3	m_6	m_7	m_8	m_{10}	m_{11}	m_{12}	m_{13}
A	x^*z	X	X	X	X					
B	y^*z	X	X				X	X		
C	xyz^*								X	X
D	xz^*t^*					X			X	
E	xy^*t^*					X	X			

$m_2, m_3 = A + B$
$m_6, m_7 = A$
$m_8 = D + E$
$m_{10} = B + E$
$m_{11} = B$
$m_{12} = C + D$
$m_{13} = C$

2 recubrimientos → $A + B + C + D$ y $A + B + C + E$

2.17

$x_1\ x_2\ x_3$	$f(x_1, x_2, x_3)$
0 0 0	0
0 0 1	0
0 1 0	0
0 1 1	1
1 0 0	0
1 0 1	1
1 1 0	0
1 1 1	1

→ $m_3 + m_5 + m_7 = x_1^* x_2 x_3 + x_1 x_2^* x_3 + x_1 x_2 x_3$

x_3 \ x_1x_2	00	01	11	10
0				
1		1	1	1

→ $x_2 x_3$
$x_1 x_3$

forma reducida: $x_2 x_3 + x_1 x_3$

	m_3	m_5	m_7
$x_2 x_3$	X		X
$x_1 x_3$		X	X

→ Forma no simplificable: $x_2 x_3 + x_1 x_3$

2.18

1.

zt \ xy	00	01	11	10
00	1	1		
01	1	1		
11			1	1
10			1	1

$\bar{x}\bar{z}$, xz > Implicantes primos

2.19

1. Múltiplos de 2 → $f=(x,y,z,t) = m_0+m_2+m_4+m_6+m_8+m_{10}+m_{12}+m_{14} =$

$= \bar{x}\bar{y}\bar{z}\bar{t} + \bar{x}\bar{y}z\bar{t} + \bar{x}y\bar{z}\bar{t} + \bar{x}yz\bar{t} + x\bar{y}\bar{z}\bar{t} + x\bar{y}z\bar{t} + xy\bar{z}\bar{t} + xyz\bar{t}$

zt \ xy	00	01	11	10
00	1	1	1	1
01				
11				
10	1	1	1	1

$\bar{t}$ → implicante primo

$f=(x,y,z,t) = \bar{t}$

2. Múltiplos de 3 → $m_0+m_3+m_6+m_9+m_{12}+m_{15} =$

$= \bar{x}\bar{y}\bar{z}\bar{t} + \bar{x}\bar{y}zt + \bar{x}yz\bar{t} + x\bar{y}\bar{z}t + xy\bar{z}\bar{t} + xyzt$

zt \ xy	00	01	11	10
00	1		1	
01				1
11	1		1	
10		1		

Esta es la forma más sencilla

3. Múltiplos de 4 → $m_0+m_4+m_8+m_{12} = \bar{x}\bar{y}\bar{z}\bar{t} + \bar{x}y\bar{z}\bar{t} + x\bar{y}\bar{z}\bar{t} + xy\bar{z}\bar{t}$

zt \ xy	00	01	11	10
00	1	1	1	1
01				
11				
10				

$f=(x,y,z,t) = \bar{z}\bar{t}$

2.20

$$f=(x,y,z,t) = x\bar{y}zt + \bar{x}\bar{y}zt + xyzt + x\bar{y}\bar{z}t + x\bar{y}z\bar{t}$$

zt \ xy	00	01	11	10
00				
01				1
11	1		1	1
10				1

$$f=(x,y,z,t) = x\bar{y}t + x\bar{y}z + xzt + \bar{y}zt$$

2.21

$$f=(x,y,z) = xyz + xy\bar{z} + x\bar{y}z + \bar{x}yz$$

z \ xy	00	01	11	10
0			1	
1		1	1	1

$$\rightarrow f=(x,y,z) = xy + xz + yz$$

2.22

$$f=(x,y,z) = (x \uparrow y) \downarrow z = (x \cdot y)^{*} \downarrow z = ((x \cdot y)^{*} + z)^{*} = ((xy)^{*})^{*} \cdot z^{*} =$$

$$= \underline{\underline{xyz^{*}}}$$

2.23

$$f(x,y,z) = (x^{*}y + z)^{*} + xz^{*} = (x^{*}y)^{*}z^{*} + xz^{*} = (x + y^{*})z^{*} + xz^{*} =$$

$$= \cancel{xz^{*}} + y^{*}z^{*} + xz^{*} = \underline{x^{*}y^{*}z^{*} + xy^{*}z^{*} + xyz^{*}} + \cancel{xy^{*}z^{*}} \quad \text{FNDC}$$

$$= m_0 + m_4 + m_6$$

$$= M_1 + M_2 + M_3 + M_5 + M_7 = \underline{\bar{x}\bar{y}z + \bar{x}y\bar{z} + \bar{x}yz + x\bar{y}z + xyz} \quad \text{FNCC}$$

2.24

$$f=(x,y,z,t) = m_0\, m_3\, m_4\, m_6\, m_8\, m_9\, m_{12}\, m_{15} =$$

$$= \bar{x}\bar{y}\bar{z}\bar{t} + \bar{x}\bar{y}zt + \bar{x}y\bar{z}\bar{t} + \bar{x}yz\bar{t} + x\bar{y}\bar{z}\bar{t} + x\bar{y}\bar{z}t + xy\bar{z}\bar{t} + xyzt$$

zt \ xy	00	01	11	10
00	1	1	1	1
01				1
11	1		1	
10		1		

$$f=(x,y,z,t) = \bar{x}\bar{y}zt + xyzt + \bar{x}y\bar{t} + x\bar{y}\bar{z} + \bar{z}\bar{t}$$

2.25

zt \ xy	00	01	11	10
00	1	1		
01	1			
11		1	1	1
10			1	

		m_0	m_1	m_4	m_7	m_{11}	m_{14}	m_{15}
A	$\bar{x}\bar{y}\bar{z}$	X	X					
B	$\bar{x}\bar{z}\bar{t}$	X		X				
C	yzt				X			X
D	xzt					X		X
E	xyz						X	X

$$f=(xyzt) = \bar{x}\bar{y}\bar{z} + \bar{x}\bar{z}\bar{t} + yzt + xzt + xyz$$