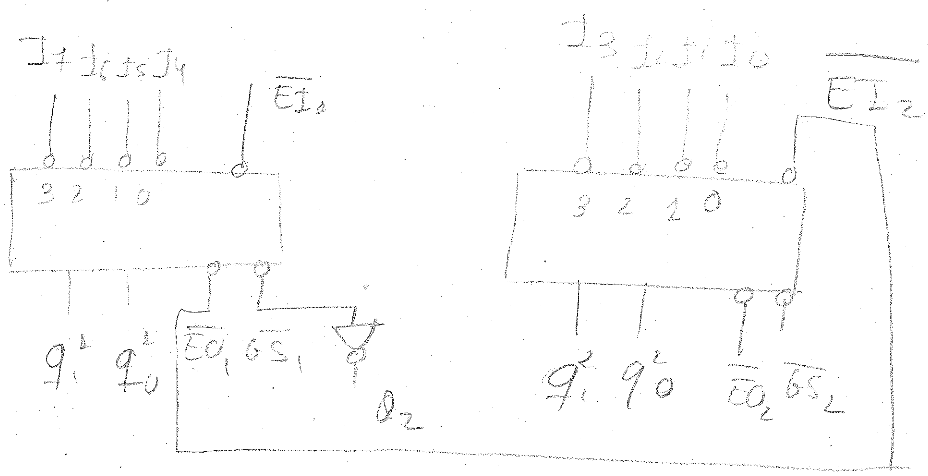
Problema 6



$Q_2 = 1$ si $I_7\ I_6\ I_5$ o I_4 estan activas

$Q_2 = 0$ si $I_3\ I_2\ I_0\ I$ están activa

o no hay ninguno activo

$Q_2 = \overline{GS}$

$Q_1 = 1$ si $q_1^1 = 1$

o $q_1^2 = 1$

Q_2	Q_1	Q_0
1	1	1
1	1	0
0	1	1
0	1	0

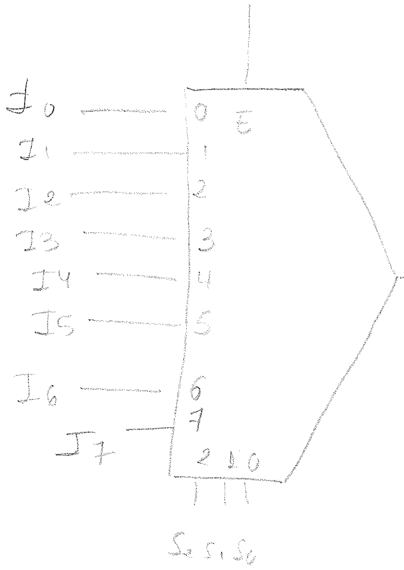
$Q_1 = q_1^1 + q_1^2$

$Q_0 = q_0^1 + q_0^2$

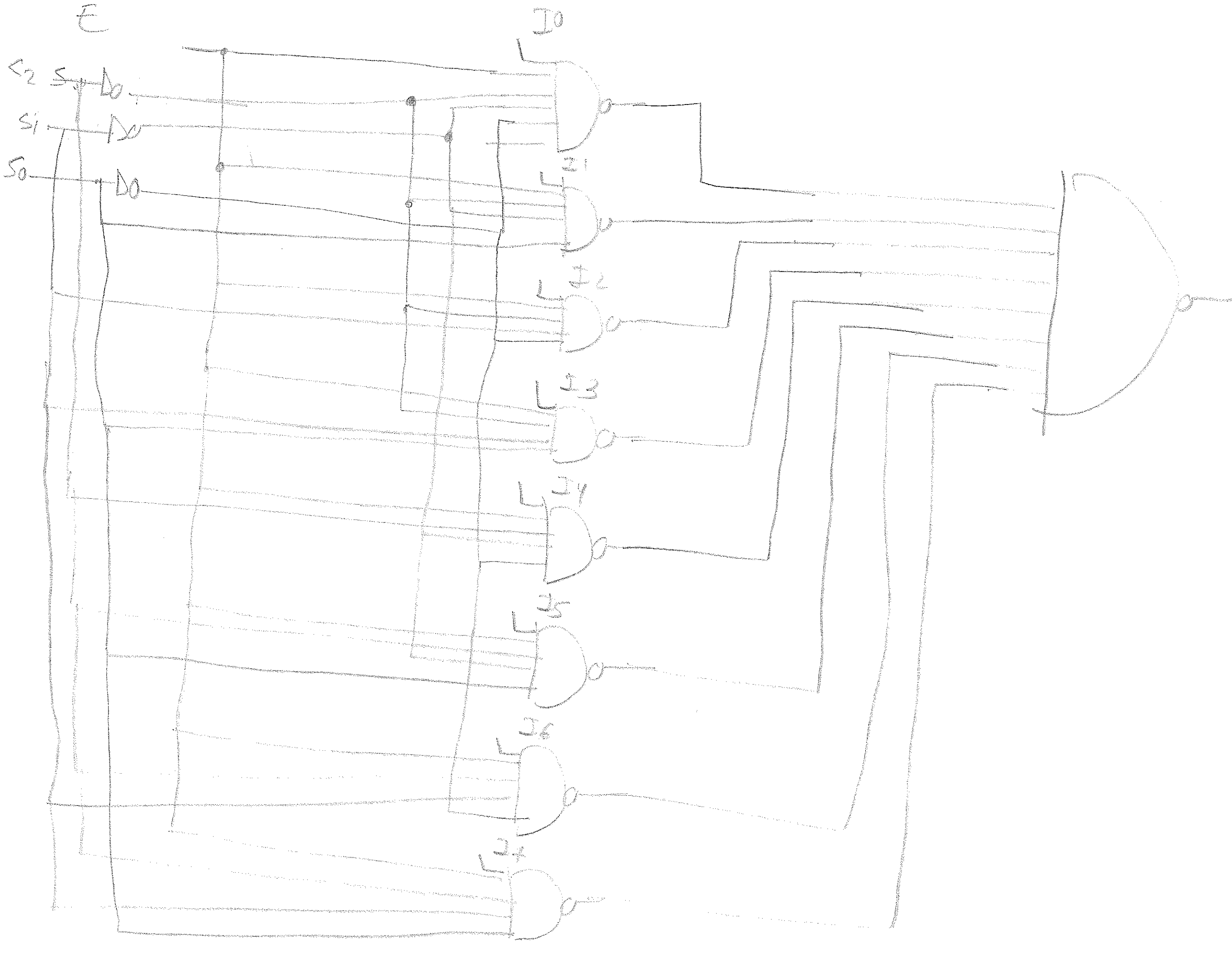
$\overline{EO} = \overline{EO_2}$

$\overline{GS} = \overline{GS_1} \cdot \overline{GS_2}$

PROBLEMA 8



$$O = E(\bar{S}_2\bar{S}_1\bar{S}_0 I_0 + \bar{S}_2\bar{S}_1 S_0 I_1 + \bar{S}_2 S_1 \bar{S}_0 I_2 + \dots + S_2 S_1 S_0 I_7)$$

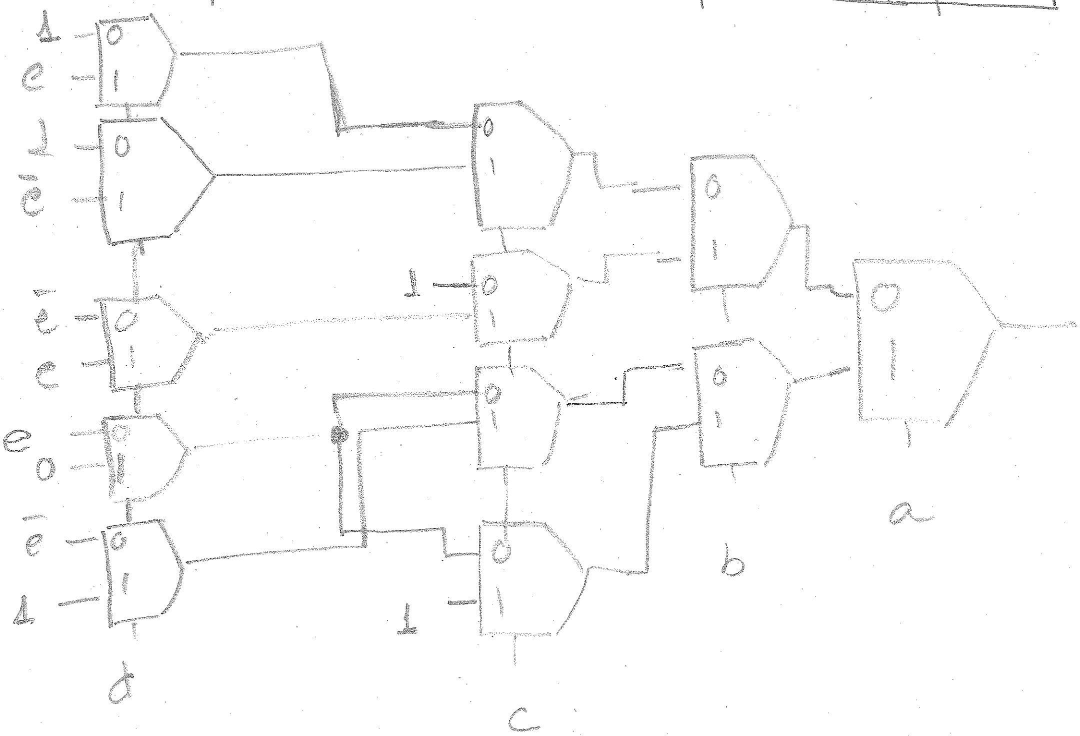


Solución P. 9 . Bol. 4

Realice con MUX 2:1 la función

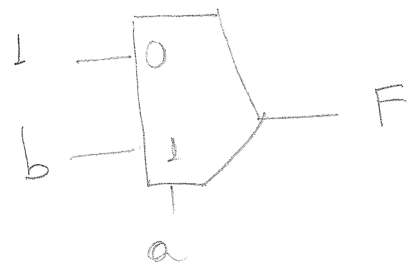
$F = \Sigma(0,1,3,4,5,6,8,9,10,11,12,15,17,20,22,23,25,28,29,30,31)$

de \ abc	000	001	011	010	110	111	101	100
00	1	1	1	1		1	1	
01	1	1		1	1	1		1
11	1		1	1		1	1	
10		1		1		1	1	



$$F(a,b,c) = \Sigma(0,3,7) + d(1,2,6)$$

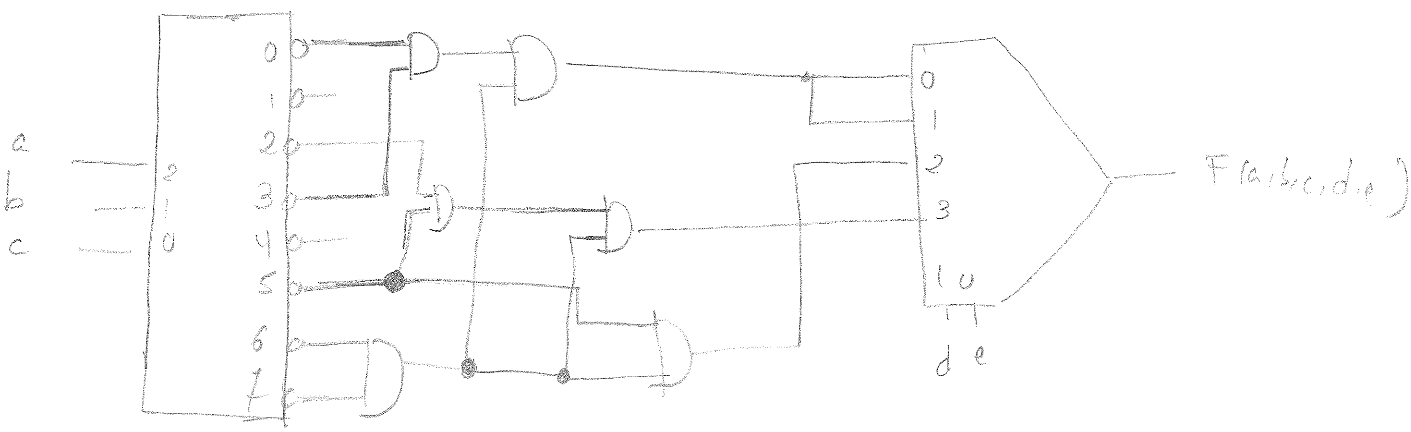
c \ ab	00	01	11	10
0	1	d	d	
1	d	1	1	



$F(a,b,c,d,e) = \sum(2,3,4,5,6,7,8,9,10,14,15,16,17,18,19,20,21)$

Un único MUX 4:1
Un único DEC 3:8
Puertas AND de dos entradas
Variables en único rail.

de \ abc	000	001	011	010	110	111	101	100
00		1		1			1	1
01		1		1			1	1
11	1	1	1					1
10	1	1	1	1				1



Problema 12

$$F = \Sigma(1,3,11,13,21,23,25,31) + d(5,19,27)$$

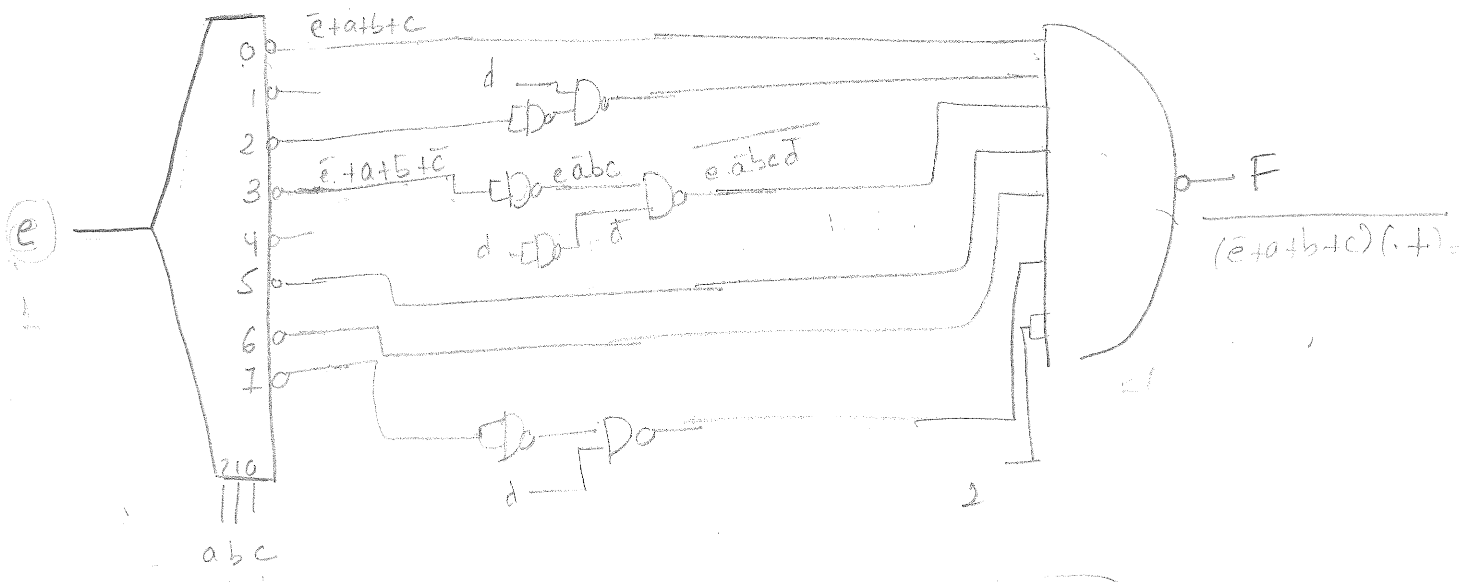
1 único DEMUX 1:8

1 NAND: 7 entradas

varias NAND de dos entradas

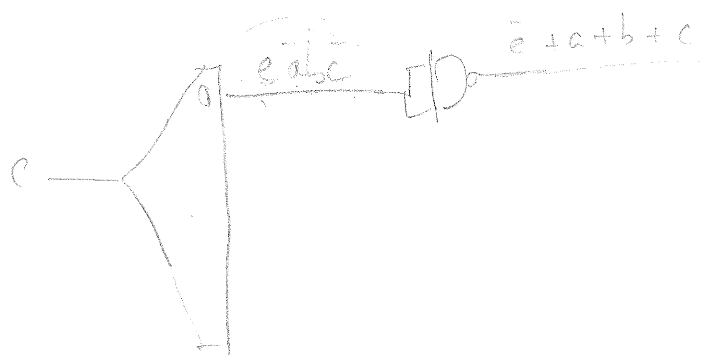
de \ abc	000	001	011	010	110	111	101	100
00								
01	1	d	$\boxed{1}$		1		1	
11	1			1	d	1	1	d
10								

F



$\bar{a}bc\bar{d}e$

$a+\bar{b}+\bar{c}+d+\bar{e}$



Problema 13

P 1

$F = \Sigma(0,1,3,7,9,12,15)$

$G = \Pi(0,1,2,5,6,10,11)$

$H = (x_3+\bar{x}_2)\cdot(x_2+\bar{x}_1+x_0) = \Sigma(0,1,3,8,9,11,12,13,14,15)$

x_1x_0 \ x_3x_2	00	01	11	10
00	1	0	1	1
01	1	0	1	1
11	1	0	1	1
10	0	0	1	0

ROM $2^4 : 3$

POS	CONT (FGH)
$0	5
$1	5
$2	0
$3	7
$4	2
$5	0
$6	0
$7	6
$8	3
$9	7
$A	0
$B	1
$C	7
$D	3
$E	3
$F	7

PROBLEMA 14

Tabla de programación de la ROM

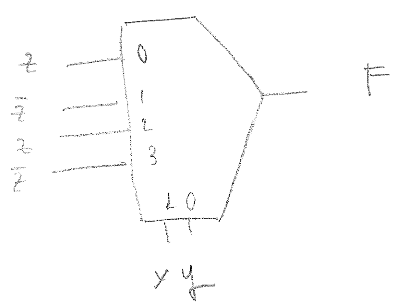
POS (x y z)	CONT F	CONT G
0	0	0
1	1	0
2	1	0
3	0	1
4	1	0
5	0	1
6	0	1
7	1	1

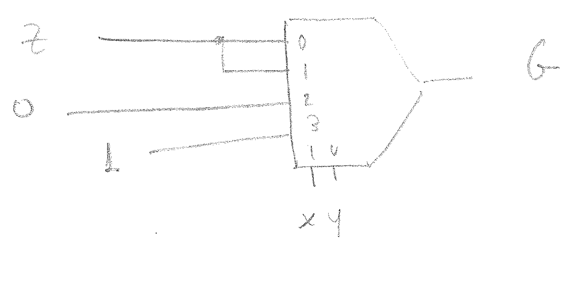
z \ xy	00	01	11	10
0	0	1	0	1
1	1	0	1	0

$F = x \oplus y \oplus z$

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

$G = \bar{x}z + xy$





PROBLEMA 15

$F = \sum(0,1,3,7,9,12,15)$

$G = \prod(0,1,2,5,6,10,11)$

$H = (x_3 + \bar{x}_2)(x_2 + \bar{x}_1 + x_0)$

PLA(4,8,3)

$x_1x_0 \backslash x_3x_2$	00	01	11	10
00	1	0	1	0
01	1	0	0	1
11	1	1	1	0
10	0	0	0	0

$x_1x_0 \backslash x_3x_2$	00	01	11	10
00	0	1	1	1
01	0	0	1	1
11	1	1	1	0
10	0	0	1	0

$x_1x_0 \backslash x_3x_2$	00	01	11	10
00	1	0	1	1
01	1	0	1	1
11	1	0	1	1
10	0	0	1	0

$F = P_1 + P_2 + P_6 + P_7 + P_8$ $\quad G = P_2 + P_3 + P_4$ $\quad H = P_1 + P_3 + P_4 + P_5$

$P_1 = \bar{x}_3 \bar{x}_2 \bar{x}_1$

$P_2 = \bar{x}_3 x_1 x_0$

$P_3 = x_3 x_2$

$P_4 = x_3 \bar{x}_1$

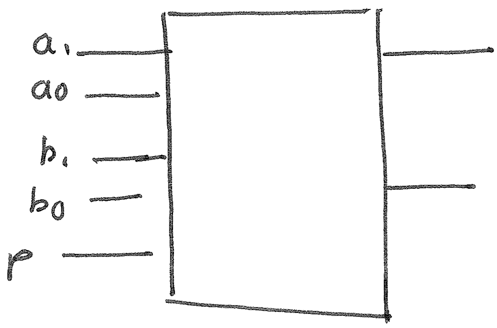
$P_5 = \bar{x}_2 x_1 x_0$

$P_6 = x_2 x_1 x_0$

$P_7 = x_3 x_2 \bar{x}_1 \bar{x}_0$

$P_8 = \bar{x}_2 \bar{x}_1 x_0$

PROBLEMA 16



$G(a \geq b) \begin{cases} =1 & a \geq b \\ =0 & a < b \end{cases}$

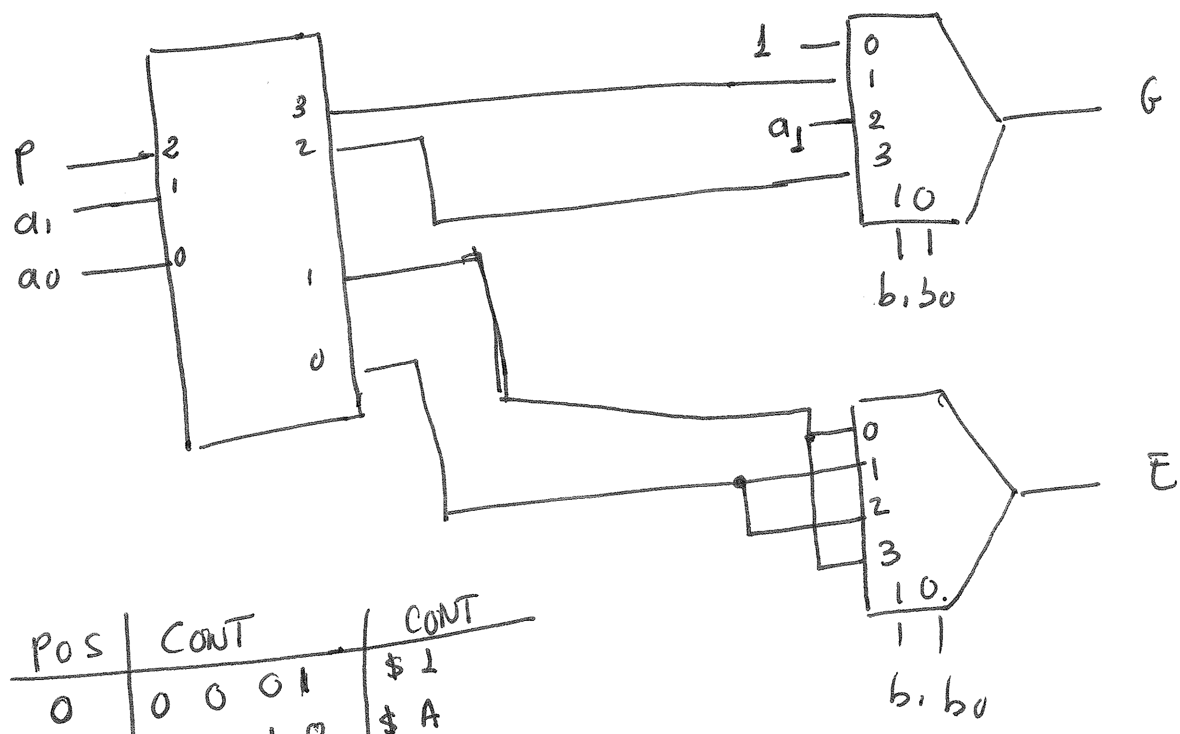
$E \begin{cases} =0 & \text{paridad par} \\ =1 & \text{paridad impar} \end{cases}$

G

$b_1b_0 \backslash p\,a_1a_0$	000	001	011	010	110	111	101	100
00	1	1	1	1	1	1	1	1
01	0	1	1	1	1	1	1	0
11	0	0	1	0	0	1	0	0
10	0	0	1	1	1	1	0	0

E

$b_1b_0 \backslash p\,a_1a_0$	000	001	011	010	110	111	101	100
00	0	1	0	1	0	1	0	1
01	1	0	1	0	1	0	1	0
11	0	1	0	1	0	1	0	1
10	1	0	1	0	1	0	1	0



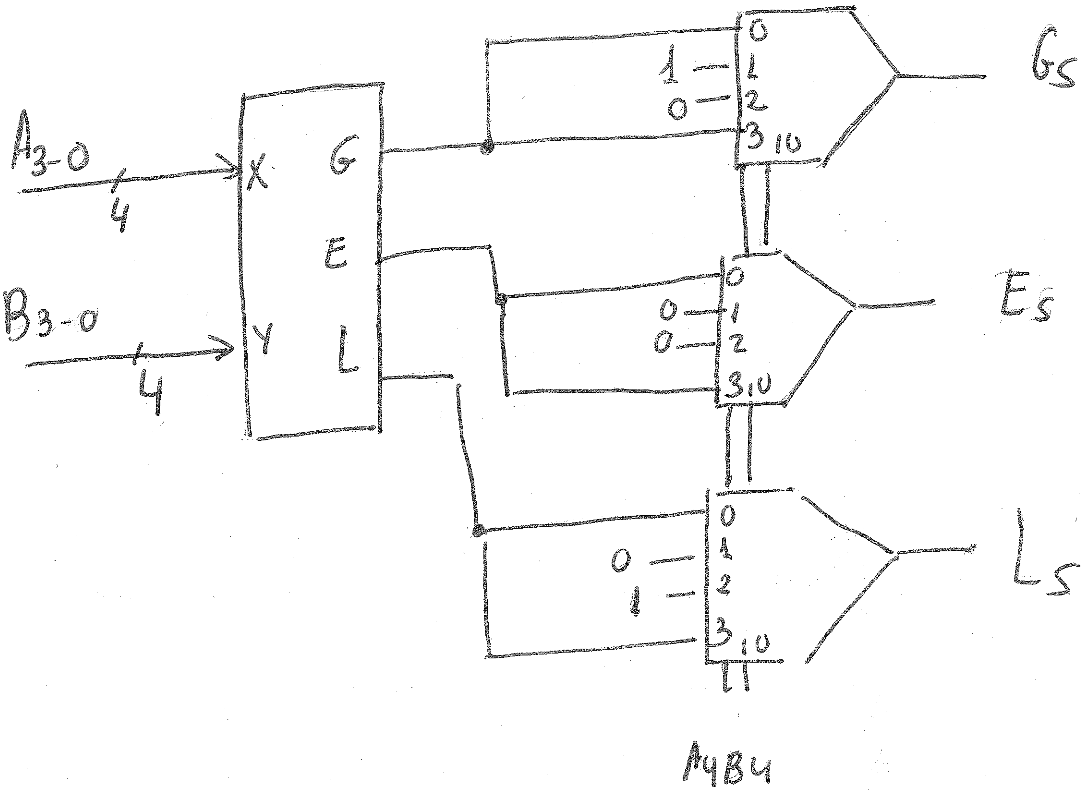
POS	CONT	CONT
0	0 0 0 1	\$1
1	1 0 1 0	\$A
2	1 0 1 0	\$A
3	1 1 0 1	\$D
4	0 0 1 0	\$2
5	1 0 0 1	\$9
6	1 0 0 1	\$9
7	1 1 1 0	\$E

PROBLEMA 17

$1\boxed{0000} \rightarrow -15$ el de menor magnitud

$1\boxed{0101} \rightarrow -10$ es el más pequeño

(a)

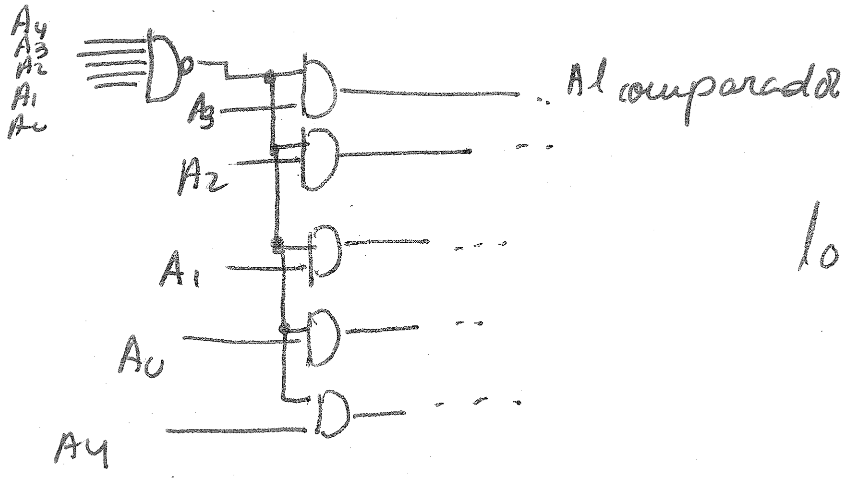


(b)

11111
00000

Se tendría que activar E pero no va a ser así

Es la única situación en la que se produce un problema. Hay que transformar el 11111 en 00000



lo mismo para B

PROBLEMA 18

(a) $f = x_1x_2 + \bar{x}_1(\bar{x}_2x_3 + x_2) =$

$= x_1x_2 + \bar{x}_1(x_3 + x_2) = x_1x_2 + \bar{x}_1x_3 + \bar{x}_1x_2 = x_2 + \bar{x}_1x_3$

(b)

$f = \bar{x}_1\bar{x}_3(\bar{x}_4\bar{x}_5 + \bar{x}_4x_5x_2) + \bar{x}_1x_3(\bar{x}_4\bar{x}_5 + \bar{x}_4x_5\bar{x}_2 + x_4x_5) +$

$+ x_1\bar{x}_3(x_4\bar{x}_5x_2) + x_1x_3(\bar{x}_4x_5x_2 + x_4\bar{x}_5x_2) =$

$= \bar{x}_1\bar{x}_3\bar{x}_4\bar{x}_5 + \bar{x}_1\bar{x}_3\bar{x}_4x_5x_2 + \bar{x}_1x_3\bar{x}_4\bar{x}_5 + \bar{x}_1x_3\bar{x}_4x_5\bar{x}_2 +$

$+ \bar{x}_1x_3x_4x_5 + x_1\bar{x}_3x_4\bar{x}_5x_2 + x_1x_3\bar{x}_4x_5x_2 + x_1x_3x_4\bar{x}_5x_2$

$x_4x_5 \backslash x_1x_2x_3$	000	001	011	010	110	111	101	100
00	1	1	1	1				
01		1		1		1		
11		1	1					
10			1			1		

$f = \bar{x}_1\bar{x}_4\bar{x}_5 + \bar{x}_1\bar{x}_2x_3x_5 + \bar{x}_1x_3x_4x_5 + \bar{x}_1x_2\bar{x}_3\bar{x}_4 + x_2x_3x_4\bar{x}_5 +$

$+ x_1x_2x_3\bar{x}_4x_5$

PROBLEMA 18

(c)

$$f = E\left(\bar{x}(\bar{y}+z) + x(\bar{y}+\bar{z})\right)$$

$$E = \overline{(y+z)(\bar{y}+z)} = \bar{z}$$

$$f = \bar{z}\left(\bar{x}\bar{y} + \bar{x}z + x\bar{y} + x\bar{z}\right) = \bar{z}\left(\bar{y} + \bar{x}z + x\bar{z}\right) = \bar{z}\bar{y} + x\bar{z}$$

PROBLEMA 19

$$F = \sum(1,2,3,4,6,7,8,9,14)$$

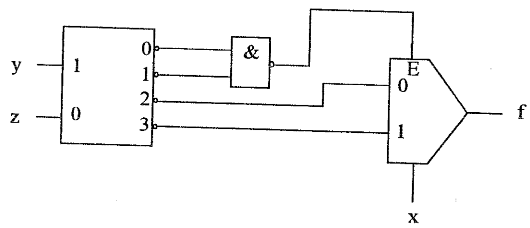
Al obtenerse una s.p. negada, la función que tengo que programar en la PAL es $\overline{F} = \sum(0,5,10,11,12,13,15$

cd \ ab	00	01	11	10
00	1		1	
01		1	1	
11			1	1
10				1

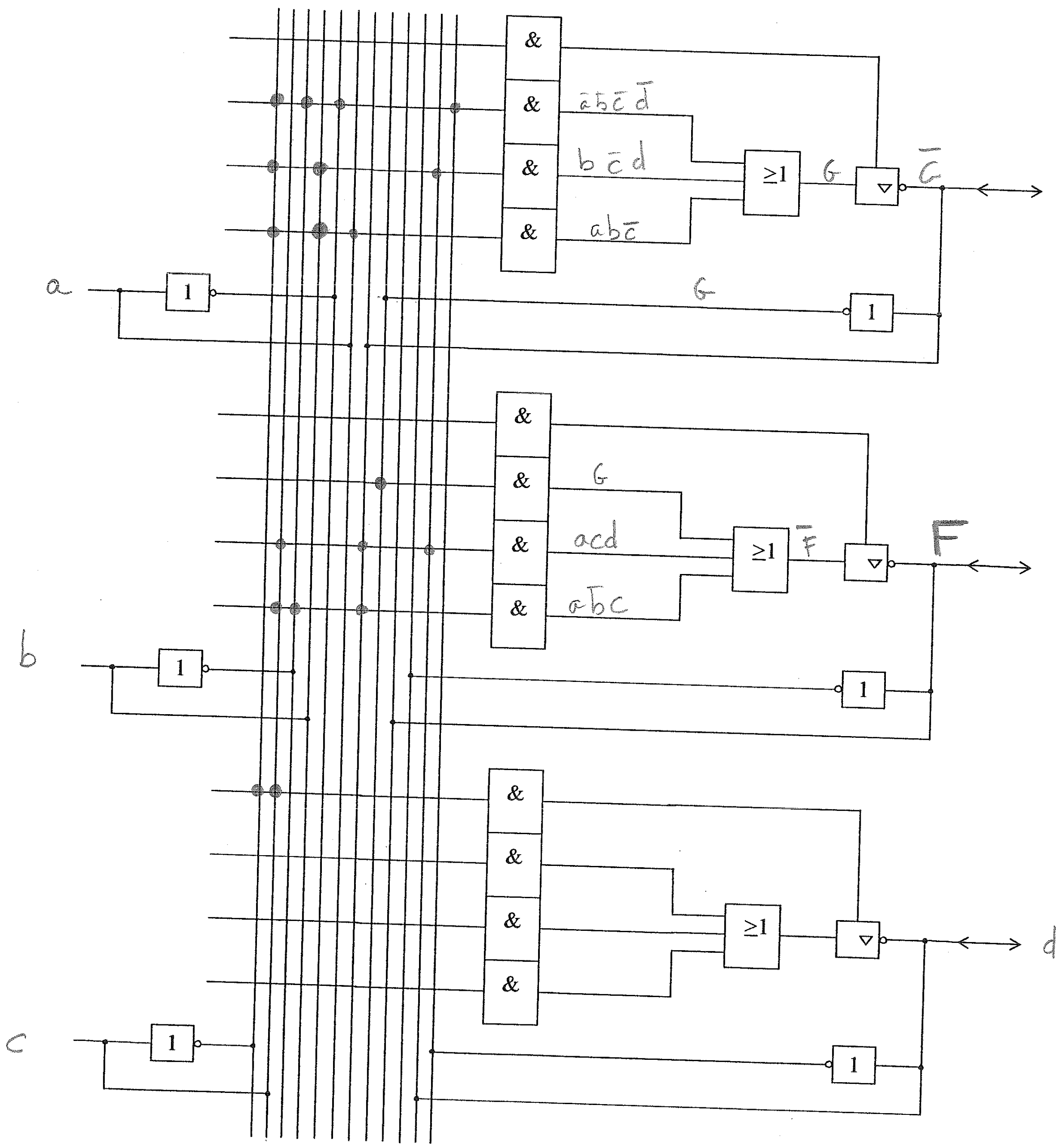
$$\overline{F} = \underbrace{\bar a \bar b \bar c \bar d + b \bar c d + ab\bar c}_{6} + acd + a\bar b c$$

$$\overline{F} = 6 + acd + a\bar b c$$

c)



P19. Realice la función F=Σ (1,2,3,4,6,7,8,9,14), mediante la PAL de la figura .

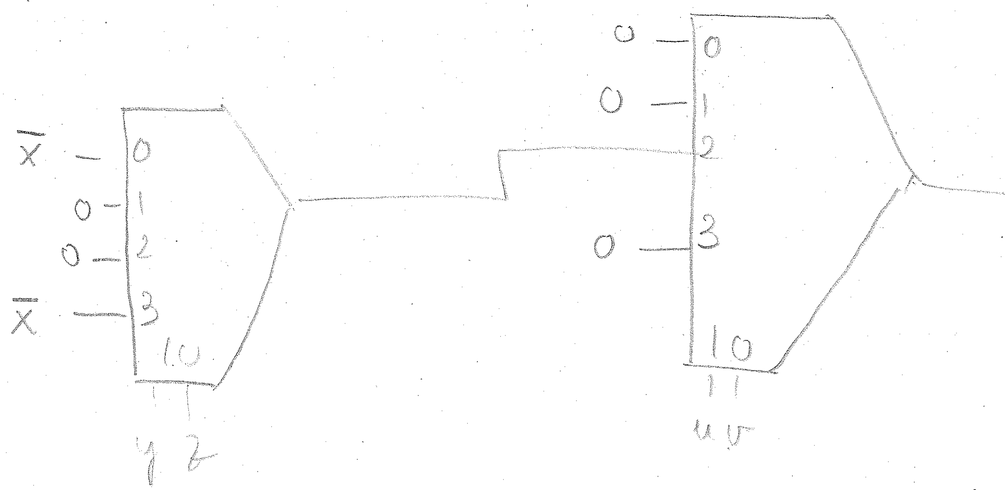


PROBLEMA 20

(a)

uv \ xyz	000	001	011	010	110	111	101	100
00	0	0	0	0	0	0	0	0
01	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0
10	1	0	1	0	0	0	0	0

(b)



PROBLEMA 21

$$f = \bar{x} D_3 + x\bar{y} + \bar{x} D_2 + xy + \bar{x} D_1 + x\bar{y} + \bar{x} D_0 =$$

$$= \bar{x} D_3 + x + \bar{x} D_2 + \bar{x} D_1 + \bar{x} D_0 =$$

$$x + \bar{x}\,(D_3 + D_2 + D_1 + D_0)$$

De la ROM sólo se utilizan las posiciones 2 y 3

POS			CONT			
0	1	2	D_3	D_2	D_1	D_0
0	1	0	1	0	0	0
0	1	1	0	0	0	0

Por lo tanto

$D_2 = D_1 = D_0 = 0$

$D_3 = \bar{z}$

$$f = x + \bar{x}\bar{z} = x + \bar{z}$$

PROBLEMA 22

El sistema permite la visualización en los displays de 7 segmentos del contenido de la ROM

PROBLEMA 23

$f = 1$ si $x_1 x_0 \geq y_1 y_0$

PROBLEMA 24

$$f_1 = \overline{\overline{D_1}\,\overline{D_0}\,D_3 + \overline{D_1}\,D_0\,D_3 + D_1\,\overline{D_0}\,D_3} = \overline{\overline{D_1}\,D_3 + D_1\,\overline{D_0}\,D_3} =$$

$$= \overline{D_3\,(\overline{D_1} + D_1\,\overline{D_0})} = \overline{D_3\,(\overline{D_1} + \overline{D_0})} = \overline{D_3} + D_1 D_0$$

$$f_2 = D_1 D_0 D_3$$

Debemos calcular D_1 D_0 y D_3 en función de las variables de entrada para ello nos basamos en la programación de la ROM

POS			CONT			
b	a	c	D_3	D_2	D_1	D_0
0	0	0	1	0	1	0
0	0	1	1	1	0	1
0	1	0	0	0	1	0
0	1	1	1	0	1	1
1	0	0	1	1	0	0
1	0	1	0	1	1	1
1	1	0	0	0	1	1
1	1	1	0	1	1	1

c \ ba	00	01	11	10
0	1			1
1	1	1		

$$D_3 = \overline{b}c + \overline{a}\,\overline{c}$$

c \ ba	00	01	11	10
0	1	1	1	
1		1	1	1

$$D_1 = \overline{b}\,\overline{c} + a + bc$$

c \ ba	00	01	11	10
0			1	
1	1	1	1	1

$$D_0 = c + ba$$

PROBLEMA 24

Sustituyendo en las funciones:

$$f_1 = \overline{(\bar{b}c + \bar{a}\bar{c})} + (\bar{b}\bar{c} + a + bc)(c + ba) =$$

$$= (b+\bar{c})(a+c) + ac + ab + bc = ab + a\bar{c} + ac + ab + bc = a + bc$$

$$f_2 = (\bar{b}\bar{c} + a + bc)(c + ba)(\bar{b}c + \bar{a}\bar{c}) =$$

$$= (ac + ab + bc)(\bar{b}c + \bar{a}\bar{c}) = a\bar{b}c$$

Problema 25

Si $x_3x_2x_1x_0 = y_3y_2y_1y_0$, $z_3z_2z_1z_0 = 0000$

Si $x_3x_2x_1x_0 > y_3y_2y_1y_0$, $z_3z_2z_1z_0 = x_3x_2x_1x_0$

ya que en este caso $A<B = 1$

Si $x_3x_2x_1x_0 < y_3y_2y_1y_0$, $z_3z_2z_1z_0 = y_3y_2y_1y_0$

ya que en este caso $A<B = 0$

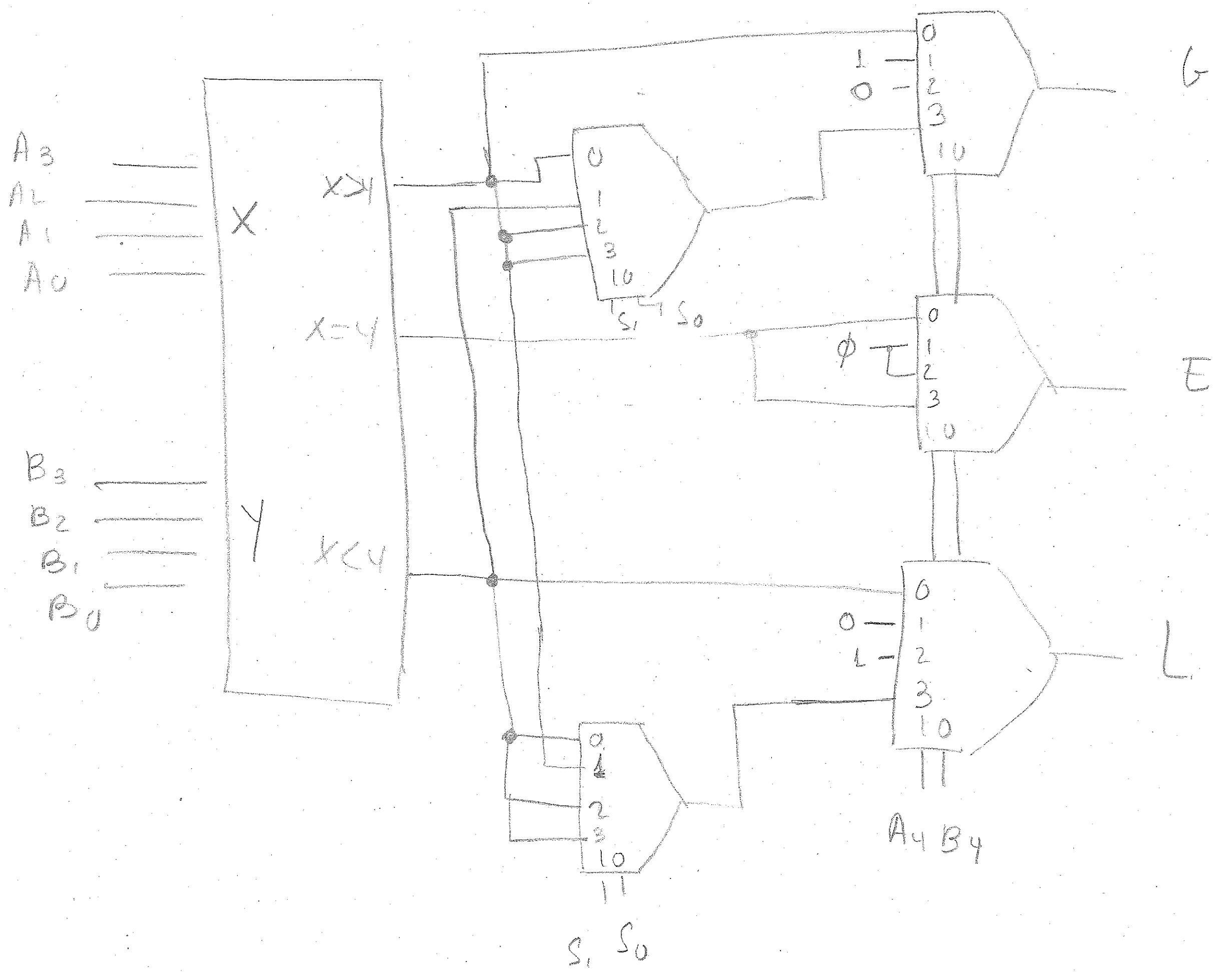
• A la salida se obtiene el mayor de los dos números de entrada o $\emptyset$ si son iguales

El circuito puede diseñarse con una ROM $2^8 \times 4$.

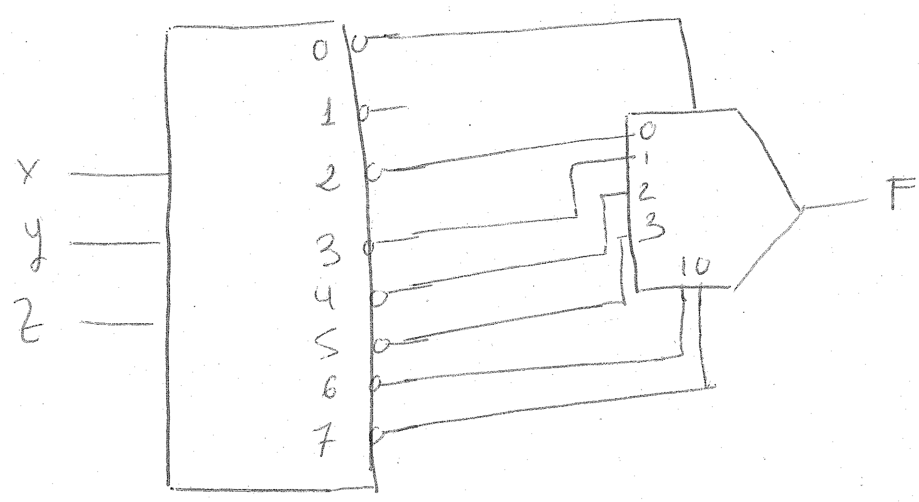
A continuación se indica el contenido de la ROM para los casos mencionados en el enunciado

POS $x_3x_2x_1x_0$ $y_3y_2y_1y_0$	CONT $z_3z_2z_1z_0$
\$ 1 $\emptyset$	\$ 1
\$ 1 1	\$ $\emptyset$
\$ 1 2	\$ 2
\$ 6 7	\$ 7
\$ 8 4	\$ 8
\$ A A	\$ $\emptyset$
\$ D F	\$ F

Problema 26

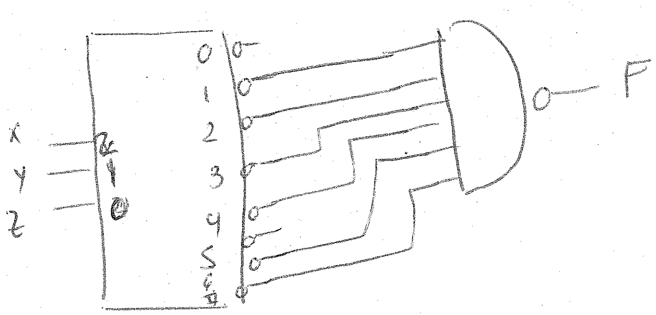


PROBLEMA 44



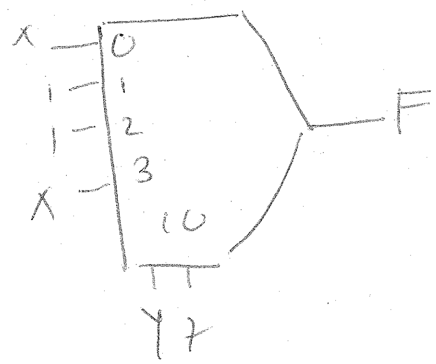
$F = \prod(0,5)$

(a)



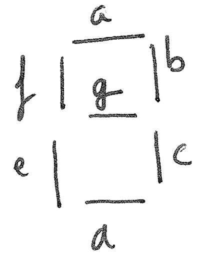
(b)

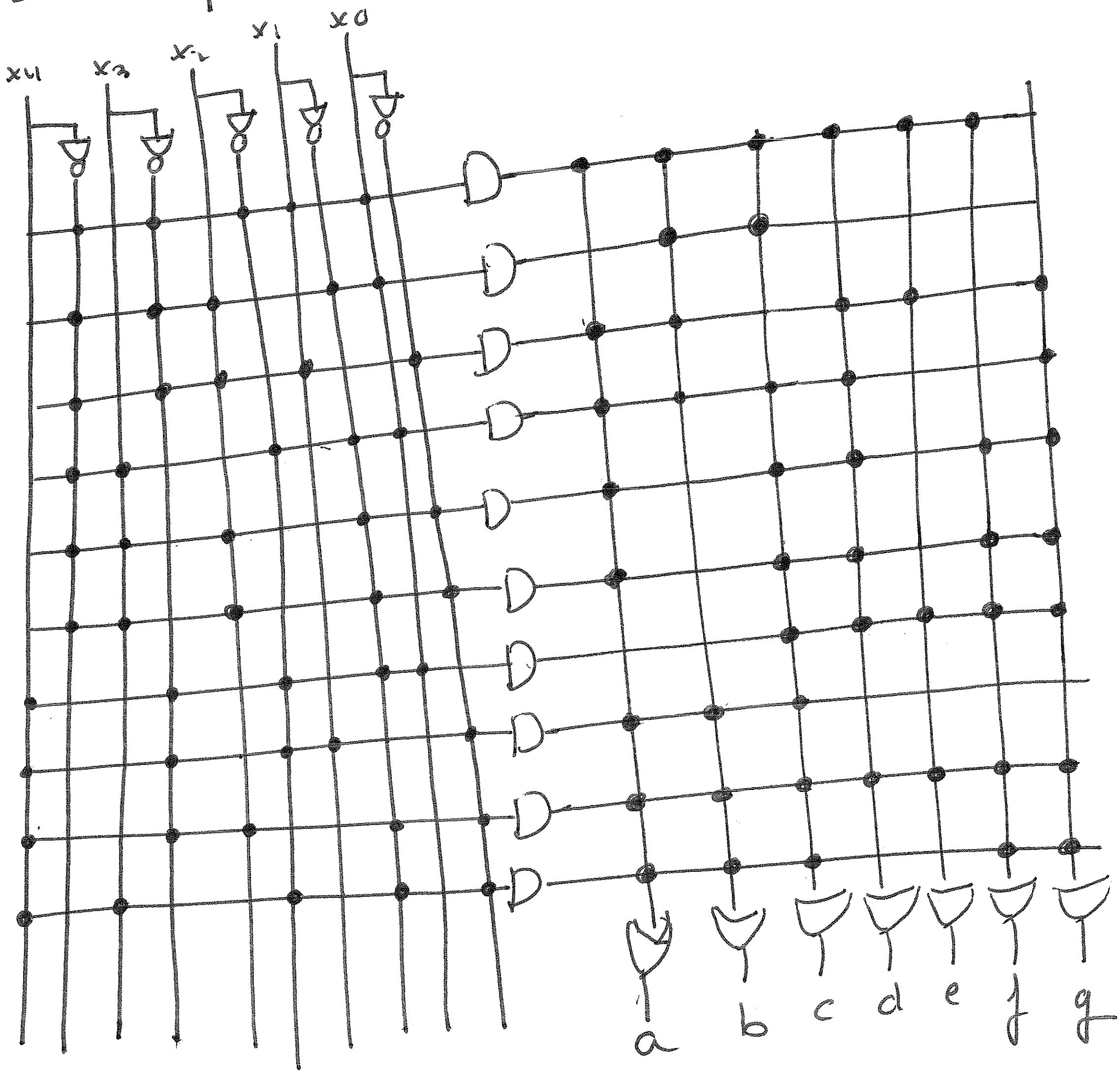
$z \backslash xy$	00	01	11	10
0	0	1	1	1
1	1	1	1	0



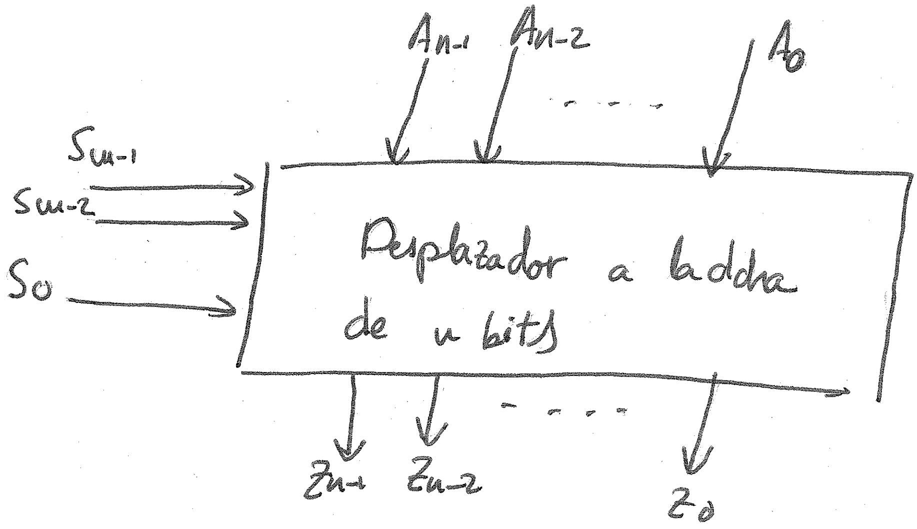
PROBLEMA 46

x_4	x_3	x_2	x_1	x_0	a	b	c	d	e	f	g
0	0	0	1	1	1	1	1	1	1	1	0
0	0	1	0	1	0	1	1	0	0	0	0
0	0	1	1	0	1	1	0	1	1	0	1
0	1	0	0	1	1	1	1	1	0	0	1
0	1	0	1	0	1	1	1	0	0	1	1
0	1	1	0	0	1	0	1	1	0	1	1
1	0	0	0	1	0	0	1	1	1	1	1
1	0	0	1	0	1	1	1	0	0	0	0
1	0	1	0	0	1	1	1	1	1	1	1
1	1	0	0	0	1	1	1	0	0	1	1



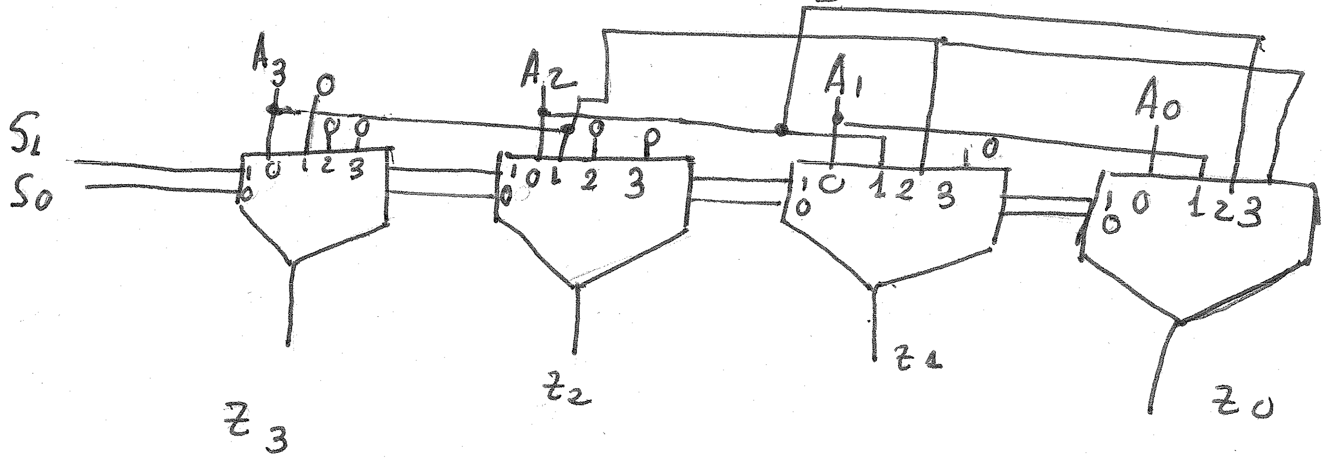


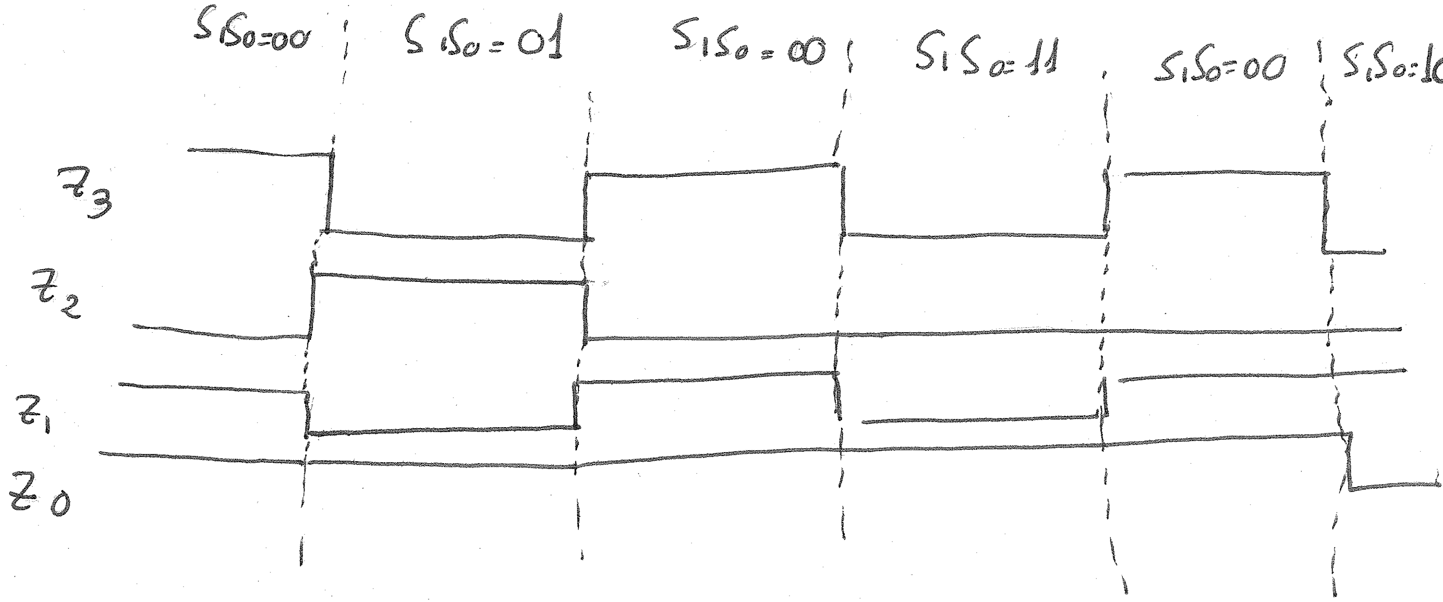
PROBLEMA 52



(a) $n=4$
$m=2$

4MUX's de 4 canales





c) dividir entre las potencias de dos