

Ejercicio 3. Convocatoria Ordinaria 1. Curso 2018/19

3.- [10 puntos]: Dada la función booleana $f: (\mathbb{B}_2)^3 \longrightarrow \mathbb{B}_2$ definida por $f(x, y, z) = (\bar{z} \rightarrow y) \oplus (\bar{y} \uparrow z)$.

Se pide:

i) [6 puntos] Calcular la expresión en maxtérminos de la función.

ii) [4 puntos] Calcular el polinomio de Gegalkine de f .

i)

x	y	z	$\bar{z}$	$\bar{z} \rightarrow y$	$\bar{y}$	$\bar{y} \uparrow z$	$(\bar{z} \rightarrow y) \oplus (\bar{y} \uparrow z)$
0	0	0	1	0	1	1	1
0	0	1	0	1	1	0	1
0	1	0	1	1	0	1	0
0	1	1	0	1	0	1	0
1	0	0	1	0	1	1	1
1	0	1	0	1	1	0	1
1	1	0	1	1	0	1	0
1	1	1	0	1	0	1	0

Handwritten notes on the right side of the table:

- For row 3 (0,1,0): $\boxed{0} \rightarrow M_{(0,1,0)}$
- For row 4 (0,1,1): $\boxed{0} \rightarrow M_{(0,1,1)}$
- For row 7 (1,1,0): $\boxed{0} \rightarrow M_{(1,1,0)}$
- For row 8 (1,1,1): $\boxed{0} \rightarrow M_{(1,1,1)}$

$$\begin{aligned}
 f(x, y, z) &= M_{(0,1,0)}(x, y, z) \wedge M_{(0,1,1)}(x, y, z) \wedge M_{(1,1,0)}(x, y, z) \\
 &\quad \wedge M_{(1,1,1)}(x, y, z) = \\
 &= (x \vee \bar{y} \vee z) \wedge (x \vee \bar{y} \vee \bar{z}) \wedge (\bar{x} \vee \bar{y} \vee z) \wedge (\bar{x} \vee \bar{y} \vee \bar{z})
 \end{aligned}$$

ii) $\{1, \oplus, \wedge\}$

$$f(x, y, z) = (\bar{z} \rightarrow y) \oplus (\bar{y} \uparrow z)$$

$$\begin{aligned}
 \bar{x} &= 1 \oplus x = \\
 &= x \oplus 1
 \end{aligned}$$

x	$\bar{x}$	$x \oplus 1$
0	1	1
1	0	0

$$\begin{aligned}
 &= \overline{\bar{z} \wedge \bar{y}} \oplus \overline{\bar{y} \wedge z} \\
 &= \left(\overline{(\bar{z} \oplus 1) \wedge (\bar{y} \oplus 1)} \right) \oplus \left(\overline{(y \oplus 1) \wedge z} \right)
 \end{aligned}$$