



Ejemplos de Método de Quine- McCluskey.

Materia FDD

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Truth table:

	x_3	x_2	x_1	x_0	y
0:	0	0	0	0	0
1:	0	0	0	1	×
2:	0	0	1	0	0
3:	0	0	1	1	×
4:	0	1	0	0	0
5:	0	1	0	1	×
6:	0	1	1	0	0
7:	0	1	1	1	1
8:	1	0	0	0	×
9:	1	0	0	1	0
10:	1	0	1	0	×
11:	1	0	1	1	×
12:	1	1	0	0	1
13:	1	1	0	1	×
14:	1	1	1	0	1
15:	1	1	1	1	1

Halle todos los implicantes primos de la función $F(x,y,z, t)$ dada por $Pm(7,12,14,15)+Pd(1,3,5,8,10,11,13)$ utilizando el método de Quine-McCluskey.

Truth table:

	x_3	x_2	x_1	x_0	y
0:	0	0	0	0	0
1:	0	0	0	1	×
2:	0	0	1	0	0
3:	0	0	1	1	×
4:	0	1	0	0	0
5:	0	1	0	1	×
6:	0	1	1	0	0
7:	0	1	1	1	1
8:	1	0	0	0	×
9:	1	0	0	1	0
10:	1	0	1	0	×
11:	1	0	1	1	×
12:	1	1	0	0	1
13:	1	1	0	1	×
14:	1	1	1	0	1
15:	1	1	1	1	1

Halle todos los implicantes primos de la función $F(x,y,z, t)$ dada por $Pm(7,12,14,15)+Pd(1,3,5,8,10,11,13)$ utilizando el método de Quine-McCluskey.

Implicants (Order 0):

	x_3	x_2	x_1	x_0	
1:	0	0	0	1	→
3:	0	0	1	1	→
5:	0	1	0	1	→
7:	0	1	1	1	→
8:	1	0	0	0	→
10:	1	0	1	0	→
11:	1	0	1	1	→
12:	1	1	0	0	→
13:	1	1	0	1	→
14:	1	1	1	0	→
15:	1	1	1	1	→

Implicants (Order 1):

	x_3	x_2	x_1	x_0	
1, 3:	0	0	-	1	→
1, 5:	0	-	0	1	→
3, 7:	0	-	1	1	→
3, 11:	-	0	1	1	→
5, 7:	0	1	-	1	→
5, 13:	-	1	0	1	→
7, 15:	-	1	1	1	→
8, 10:	1	0	-	0	→
8, 12:	1	-	0	0	→
10, 11:	1	0	1	-	→
10, 14:	1	-	1	0	→
11, 15:	1	-	1	1	→
12, 13:	1	1	0	-	→
12, 14:	1	1	-	0	→
13, 15:	1	1	-	1	→
14, 15:	1	1	1	-	→

Halle todos los implicantes primos de la función $F(x,y,z, t)$ dada por $Pm(7,12,14,15)+Pd(1,3,5,8,10,11,13)$ utilizando el método de Quine-McCluskey.

Implicants (Order 1):

	x_3	x_2	x_1	x_0	
1, 3:	0	0	-	1	→
1, 5:	0	-	0	1	→
3, 7:	0	-	1	1	→
3, 11:	-	0	1	1	→
5, 7:	0	1	-	1	→
5, 13:	-	1	0	1	→
7, 15:	-	1	1	1	→
8, 10:	1	0	-	0	→
8, 12:	1	-	0	0	→
10, 11:	1	0	1	-	→
10, 14:	1	-	1	0	→
11, 15:	1	-	1	1	→
12, 13:	1	1	0	-	→
12, 14:	1	1	-	0	→
13, 15:	1	1	-	1	→
14, 15:	1	1	1	-	→

Implicants (Order 2):

	x_3	x_2	x_1	x_0	
1, 3, 5, 7:	0	-	-	1	✓
3, 7, 11, 15:	-	-	1	1	✓
5, 7, 13, 15:	-	1	-	1	✓
8, 10, 12, 14:	1	-	-	0	✓
10, 11, 14, 15:	1	-	1	-	✓
12, 13, 14, 15:	1	1	-	-	✓

Halle todos los implicantes primos de la función $F(x,y,z, t)$ dada por $Pm(7,12,14,15)+Pd(1,3,5,8,10,11,13)$ utilizando el método de Quine-McCluskey.

Prime implicant chart:

	x_3	x_2	x_1	x_0	7	12	14	15	
1, 3, 5, 7:	0	-	-	1	○				(\bar{x}_3x_0)
3, 7, 11, 15:	-	-	1	1	○			○	(x_1x_0)
5, 7, 13, 15:	-	1	-	1	○			○	(x_2x_0)
8, 10, 12, 14:	1	-	-	0		○	○		$(x_3\bar{x}_0)$
10, 11, 14, 15:	1	-	1	-			○	○	(x_3x_1)
12, 13, 14, 15:	1	1	-	-		○	○	○	(x_3x_2)

Truth table:

	x_4	x_3	x_2	x_1	x_0	y
0:	0	0	0	0	0	1
1:	0	0	0	0	1	0
2:	0	0	0	1	0	1
3:	0	0	0	1	1	0
4:	0	0	1	0	0	0
5:	0	0	1	0	1	×
6:	0	0	1	1	0	1
7:	0	0	1	1	1	1
8:	0	1	0	0	0	1
9:	0	1	0	0	1	×
10:	0	1	0	1	0	1
11:	0	1	0	1	1	1
12:	0	1	1	0	0	1
13:	0	1	1	0	1	1
14:	0	1	1	1	0	1
15:	0	1	1	1	1	0
16:	1	0	0	0	0	1
17:	1	0	0	0	1	0
18:	1	0	0	1	0	1
19:	1	0	0	1	1	1
20:	1	0	1	0	0	0
21:	1	0	1	0	1	×
22:	1	0	1	1	0	0
23:	1	0	1	1	1	0
24:	1	1	0	0	0	0
25:	1	1	0	0	1	0
26:	1	1	0	1	0	0
27:	1	1	0	1	1	0
28:	1	1	1	0	0	0
29:	1	1	1	0	1	1
30:	1	1	1	1	0	1
31:	1	1	1	1	1	0

Halle una expresión en forma de suma de productos mínima para la función $F(a,b, c,d, e) = Pm(0,2,6,7,8,10,11,12,13,14,16,18,19,29,30)+ Pd(5,9,21)$ utilizando el método de Quine-McCluskey.

Halle una expresión en forma de suma de productos mínima para la función $F(a,b, c,d, e) = Pm(0,2,6,7,8,10,11,12,13,14,16,18,19,29,30)+ Pd(5,9,21)$ utilizando el método de Quine-McCluskey.

Implicants (Order 0):

	x_4	x_3	x_2	x_1	x_0	
0:	0	0	0	0	0	→
2:	0	0	0	1	0	→
5:	0	0	1	0	1	→
6:	0	0	1	1	0	→
7:	0	0	1	1	1	→
8:	0	1	0	0	0	→
9:	0	1	0	0	1	→
10:	0	1	0	1	0	→
11:	0	1	0	1	1	→
12:	0	1	1	0	0	→
13:	0	1	1	0	1	→
14:	0	1	1	1	0	→
16:	1	0	0	0	0	→
18:	1	0	0	1	0	→
19:	1	0	0	1	1	→
21:	1	0	1	0	1	→
29:	1	1	1	0	1	→
30:	1	1	1	1	0	→

Implicants (Order 1):

	x_4	x_3	x_2	x_1	x_0	
0, 2:	0	0	0	-	0	→
0, 8:	0	-	0	0	0	→
0, 16:	-	0	0	0	0	→
2, 6:	0	0	-	1	0	→
2, 10:	0	-	0	1	0	→
2, 18:	-	0	0	1	0	→
5, 7:	0	0	1	-	1	✓
5, 13:	0	-	1	0	1	→
5, 21:	-	0	1	0	1	→
6, 7:	0	0	1	1	-	✓
6, 14:	0	-	1	1	0	→
8, 9:	0	1	0	0	-	→
8, 10:	0	1	0	-	0	→
8, 12:	0	1	-	0	0	→
9, 11:	0	1	0	-	1	→
9, 13:	0	1	-	0	1	→
10, 11:	0	1	0	1	-	→
10, 14:	0	1	-	1	0	→
12, 13:	0	1	1	0	-	→
12, 14:	0	1	1	-	0	→
13, 29:	-	1	1	0	1	→
14, 30:	-	1	1	1	0	✓
16, 18:	1	0	0	-	0	→
18, 19:	1	0	0	1	-	✓
21, 29:	1	-	1	0	1	→

Halle una expresión en forma de suma de productos mínima para la función $F(a,b, c,d, e) = Pm(0,2,6,7,8,10,11,12,13,14,16,18,19,29,30)+ Pd(5,9,21)$ utilizando el método de Quine-McCluskey.

Implicants (Order 0):

	x_4	x_3	x_2	x_1	x_0	
0:	0	0	0	0	0	→
2:	0	0	0	1	0	→
5:	0	0	1	0	1	→
6:	0	0	1	1	0	→
7:	0	0	1	1	1	→
8:	0	1	0	0	0	→
9:	0	1	0	0	1	→
10:	0	1	0	1	0	→
11:	0	1	0	1	1	→
12:	0	1	1	0	0	→
13:	0	1	1	0	1	→
14:	0	1	1	1	0	→
16:	1	0	0	0	0	→
18:	1	0	0	1	0	→
19:	1	0	0	1	1	→
21:	1	0	1	0	1	→
29:	1	1	1	0	1	→
30:	1	1	1	1	0	→

Implicants (Order 1):

	x_4	x_3	x_2	x_1	x_0	
0, 2:	0	0	0	-	0	→
0, 8:	0	-	0	0	0	→
0, 16:	-	0	0	0	0	→
2, 6:	0	0	-	1	0	→
2, 10:	0	-	0	1	0	→
2, 18:	-	0	0	1	0	→
5, 7:	0	0	1	-	1	✓
5, 13:	0	-	1	0	1	→
5, 21:	-	0	1	0	1	→
6, 7:	0	0	1	1	-	✓
6, 14:	0	-	1	1	0	→
8, 9:	0	1	0	0	-	→
8, 10:	0	1	0	-	0	→
8, 12:	0	1	-	0	0	→
9, 11:	0	1	0	-	1	→
9, 13:	0	1	-	0	1	→
10, 11:	0	1	0	1	-	→
10, 14:	0	1	-	1	0	→
12, 13:	0	1	1	0	-	→
12, 14:	0	1	1	-	0	→
13, 29:	-	1	1	0	1	→
14, 30:	-	1	1	1	0	✓
16, 18:	1	0	0	-	0	→
18, 19:	1	0	0	1	-	✓
21, 29:	1	-	1	0	1	→

Halle una expresión en forma de suma de productos mínima para la función $F(a,b, c,d, e) = Pm(0,2,6,7,8,10,11,12,13,14,16,18,19,29,30)+ Pd(5,9,21)$ utilizando el método de Quine-McCluskey.

Implicants (Order 1):

	x_4	x_3	x_2	x_1	x_0	
0, 2:	0	0	0	-	0	→
0, 8:	0	-	0	0	0	→
0, 16:	-	0	0	0	0	→
2, 6:	0	0	-	1	0	→
2, 10:	0	-	0	1	0	→
2, 18:	-	0	0	1	0	→
5, 7:	0	0	1	-	1	✓
5, 13:	0	-	1	0	1	→
5, 21:	-	0	1	0	1	→
6, 7:	0	0	1	1	-	✓
6, 14:	0	-	1	1	0	→
8, 9:	0	1	0	0	-	→
8, 10:	0	1	0	-	0	→
8, 12:	0	1	-	0	0	→
9, 11:	0	1	0	-	1	→
9, 13:	0	1	-	0	1	→
10, 11:	0	1	0	1	-	→
10, 14:	0	1	-	1	0	→
12, 13:	0	1	1	0	-	→
12, 14:	0	1	1	-	0	→
13, 29:	-	1	1	0	1	→
14, 30:	-	1	1	1	0	✓
16, 18:	1	0	0	-	0	→
18, 19:	1	0	0	1	-	✓
21, 29:	1	-	1	0	1	→

Implicants (Order 2):

	x_4	x_3	x_2	x_1	x_0	
0, 2, 8, 10:	0	-	0	-	0	✓
0, 2, 16, 18:	-	0	0	-	0	✓
2, 6, 10, 14:	0	-	-	1	0	✓
5, 13, 21, 29:	-	-	1	0	1	✓
8, 9, 10, 11:	0	1	0	-	-	✓
8, 9, 12, 13:	0	1	-	0	-	✓
8, 10, 12, 14:	0	1	-	-	0	✓

Halle una expresión en forma de suma de productos mínima para la función $F(a,b, c,d, e) = Pm(0,2,6,7,8,10,11,12,13,14,16,18,19,29,30)+ Pd(5,9,21)$ utilizando el método de Quine-McCluskey.

Prime implicant chart:

	x_4	x_3	x_2	x_1	x_0	0	2	6	7	8	10	11	12	13	14	16	18	19	29	30	
0, 2, 8, 10:	0	-	0	-	0	○	○			○	○										$(\bar{x}_4\bar{x}_2\bar{x}_0)$
0, 2, 16, 18:	-	0	0	-	0	○	○									●	○				$(\bar{x}_3\bar{x}_2\bar{x}_0)$
2, 6, 10, 14:	0	-	-	1	0		○	○			○				○						$(\bar{x}_4x_1\bar{x}_0)$
5, 13, 21, 29:	-	-	1	0	1									○					●		$(x_2\bar{x}_1x_0)$
8, 9, 10, 11:	0	1	0	-	-					○	○	●									$(\bar{x}_4x_3\bar{x}_2)$
8, 9, 12, 13:	0	1	-	0	-					○			○	○							$(\bar{x}_4x_3\bar{x}_1)$
8, 10, 12, 14:	0	1	-	-	0					○	○		○		○						$(\bar{x}_4x_3\bar{x}_0)$
5, 7:	0	0	1	-	1				○												$(\bar{x}_4\bar{x}_3x_2x_0)$
6, 7:	0	0	1	1	-			○	○												$(\bar{x}_4\bar{x}_3x_2x_1)$
14, 30:	-	1	1	1	0										○					●	$(x_3x_2x_1\bar{x}_0)$
18, 19:	1	0	0	1	-												○	●			$(x_4\bar{x}_3\bar{x}_2x_1)$

Extracted essential prime implicants: $(\bar{x}_4x_3\bar{x}_2)$, $(\bar{x}_3\bar{x}_2\bar{x}_0)$, $(x_4\bar{x}_3\bar{x}_2x_1)$, $(x_2\bar{x}_1x_0)$, $(x_3x_2x_1\bar{x}_0)$

Halle una expresión en forma de suma de productos mínima para la función $F(a,b, c,d, e) = Pm(0,2,6,7,8,10,11,12,13,14,16,18,19,29,30)+ Pd(5,9,21)$ utilizando el método de Quine-McCluskey.

Prime implicant chart:

	x_4	x_3	x_2	x_1	x_0	0	2	6	7	8	10	11	12	13	14	16	18	19	29	30	
0, 2, 8, 10:	0	-	0	-	0	○	○			○	○										$(\bar{x}_4\bar{x}_2\bar{x}_0)$
0, 2, 16, 18:	-	0	0	-	0	○	○									●	○				$(\bar{x}_3\bar{x}_2\bar{x}_0)$
2, 6, 10, 14:	0	-	-	1	0		○	○			○				○						$(\bar{x}_4x_1\bar{x}_0)$
5, 13, 21, 29:	-	-	1	0	1									○					●		$(x_2\bar{x}_1x_0)$
8, 9, 10, 11:	0	1	0	-	-					○	○	●									$(\bar{x}_4x_3\bar{x}_2)$
8, 9, 12, 13:	0	1	-	0	-					○			○	○							$(\bar{x}_4x_3\bar{x}_1)$
8, 10, 12, 14:	0	1	-	-	0					○	○		○		○						$(\bar{x}_4x_3\bar{x}_0)$
5, 7:	0	0	1	-	1				○												$(\bar{x}_4\bar{x}_3x_2x_0)$
6, 7:	0	0	1	1	-			○	○												$(\bar{x}_4\bar{x}_3x_2x_1)$
14, 30:	-	1	1	1	0										○					●	$(x_3x_2x_1\bar{x}_0)$
18, 19:	1	0	0	1	-												○	●			$(x_4\bar{x}_3\bar{x}_2x_1)$

Extracted essential prime implicants: $(\bar{x}_4x_3\bar{x}_2)$, $(\bar{x}_3\bar{x}_2\bar{x}_0)$, $(x_4\bar{x}_3\bar{x}_2x_1)$, $(x_2\bar{x}_1x_0)$, $(x_3x_2x_1\bar{x}_0)$

Extracted essential prime implicants: $(\bar{x}_4x_3\bar{x}_2)$, $(\bar{x}_3\bar{x}_2\bar{x}_0)$, $(x_4\bar{x}_3\bar{x}_2x_1)$, $(x_2\bar{x}_1x_0)$, $(x_3x_2x_1\bar{x}_0)$


Reduced prime implicant chart (Iteration 0):

	x_4	x_3	x_2	x_1	x_0	6	7	12	
8, 9, 12, 13:	0	1	-	0	-			●	$(\bar{x}_4x_3\bar{x}_1)$
6, 7:	0	0	1	1	-	●	●		$(\bar{x}_4\bar{x}_3x_2x_1)$

Extracted essential prime implicants: $(\bar{x}_4\bar{x}_3x_2x_1)$, $(\bar{x}_4x_3\bar{x}_1)$

Minimal boolean expression:

$$y = (\bar{x}_4x_3\bar{x}_2) \vee (\bar{x}_3\bar{x}_2\bar{x}_0) \vee (x_4\bar{x}_3\bar{x}_2x_1) \vee (x_2\bar{x}_1x_0) \vee (x_3x_2x_1\bar{x}_0) \vee (\bar{x}_4\bar{x}_3x_2x_1) \vee (\bar{x}_4x_3\bar{x}_1)$$



Halle una expresión en forma de suma de productos mínima para la función $F(a,b, c,d, e) = Pm(0,2,6,7,8,10,11,12,13,14,16,18,19,29,30) + Pd(5,9,21)$ utilizando el método de Quine-McCluskey.

Solución

Una expresión mínima en forma de suma de productos es $F(a,b, c,d, e)$

Legend:

Don't-care: \times

Implicant (non prime): \rightarrow

Prime implicant: \checkmark

Essential prime implicant: \bullet

Prime implicant but covers only don't-care: (\times)