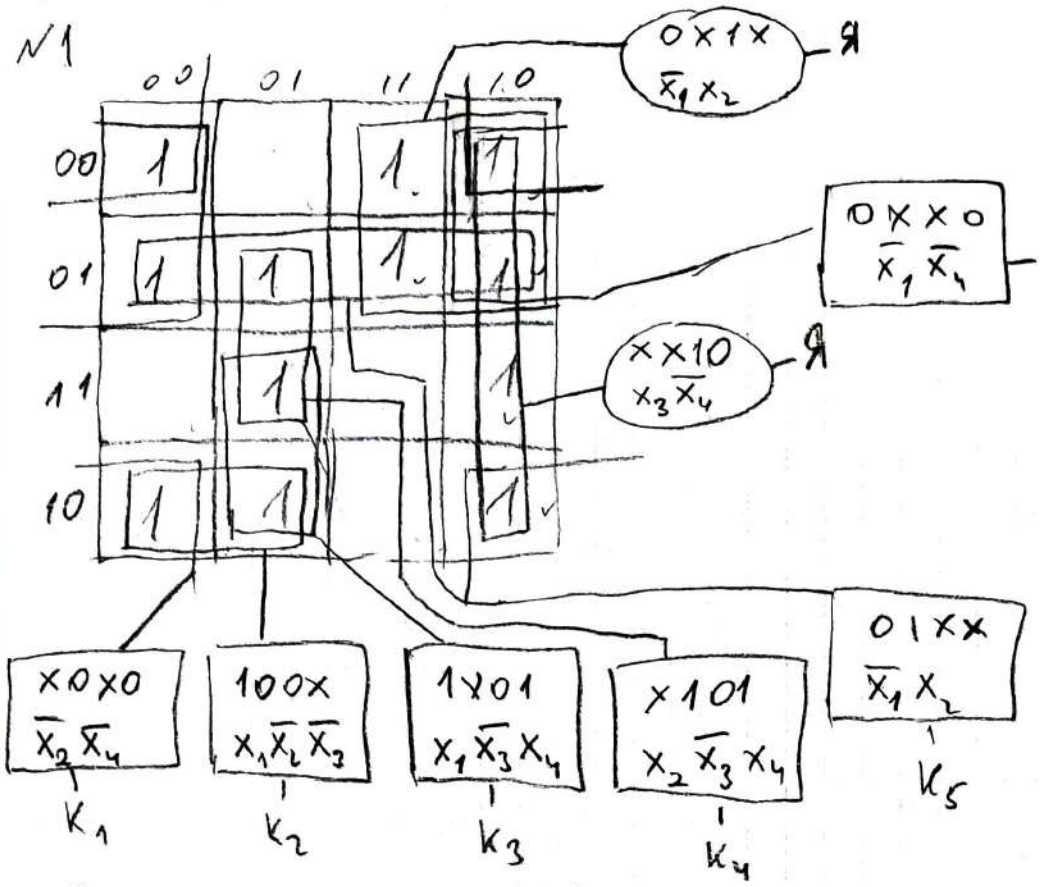
№1



Сокращенная ДНФ

$$f = \bar{x}_1 x_2 \vee x_3 \bar{x}_4 \vee \bar{x}_2 \bar{x}_4 \vee x_1 \bar{x}_2 \bar{x}_3 \vee$$
$$\vee x_1 \bar{x}_3 x_4 \vee x_2 \bar{x}_3 x_4 \vee \bar{x}_1 x_2 \vee \bar{x}_1 \bar{x}_4$$

Функция Патрика:

$$(k_1 \vee k_2)(k_2 \vee k_3)(k_3 \vee k_4)(k_4 \vee k_5)(k_5 \vee k_6)(k_1 \vee k_6) =$$

$$= (k_1 k_2 \vee k_1 k_3 \vee k_2 \vee k_2 k_3) \wedge$$
$$\wedge (k_3 k_4 \vee k_3 k_5 \vee k_4 \vee k_4 k_5) \wedge$$
$$\wedge (k_5 k_1 \vee k_5 k_6 \vee k_6 k_1 \vee k_6) =$$

$$= (k_1 k_3 \vee k_2)(k_3 k_5 \vee k_4)(k_5 k_1 \vee k_6) =$$

$$= (k_1 k_3 k_5 \vee k_1 k_3 k_4 \vee k_2 k_3 k_5 \vee k_2 k_4)(k_5 k_1 \vee k_6) =$$

$$= k_1 k_3 k_5 \vee k_1 k_3 k_5 k_6 \vee k_1 k_3 k_4 k_5 \vee k_1 k_3 k_4 k_6 \vee$$

$$\vee k_1 k_2 k_3 k_5 \vee k_2 k_3 k_5 k_6 \vee k_1 k_2 k_4 k_5 \vee k_2 k_4 k_6 =$$

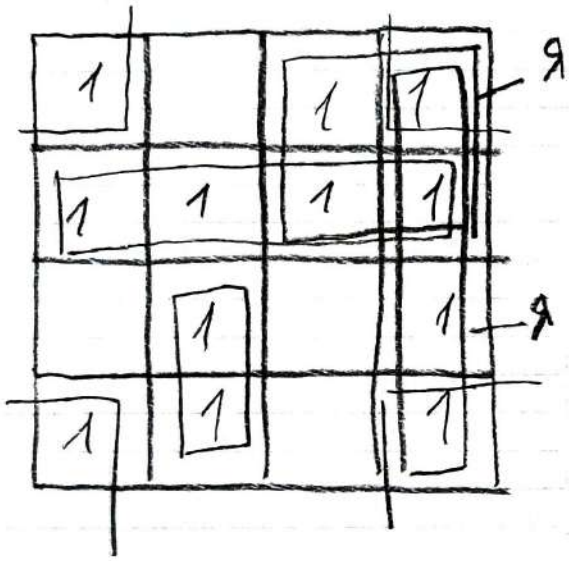
$$= k_1 k_3 k_5 \vee k_2 k_4 k_6 \vee k_1 k_3 k_4 k_6 \vee k_1 k_2 k_4 k_5 \vee k_2 k_3 k_5 k_6$$

Тупиковые ДНФ:

$$f = \underbrace{\bar{x}_1 x_2 \vee x_3 \bar{x}_4}_{\text{ядро}} \vee \begin{cases} \bar{x}_2 \bar{x}_4 \vee x_1 \bar{x}_3 x_4 \vee \bar{x}_1 x_2 - \text{мин.} \\ x_1 \bar{x}_2 \bar{x}_3 \vee x_2 \bar{x}_3 x_4 \vee \bar{x}_1 \bar{x}_4 \\ \bar{x}_2 \bar{x}_4 \vee x_1 \bar{x}_3 x_4 \vee x_2 \bar{x}_3 x_4 \vee \bar{x}_1 \bar{x}_4 \\ \bar{x}_2 \bar{x}_4 \vee x_1 \bar{x}_2 \bar{x}_3 \vee x_2 \bar{x}_3 x_4 \vee \bar{x}_1 x_2 \\ x_1 \bar{x}_2 \bar{x}_3 \vee x_1 \bar{x}_3 x_4 \vee \bar{x}_1 x_2 \vee \bar{x}_1 \bar{x}_4 \end{cases}$$

$\boxed{m = 5 \quad l = 7}$

2)



$f = (1, 0, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 0, 0, 1, 1, 0)$

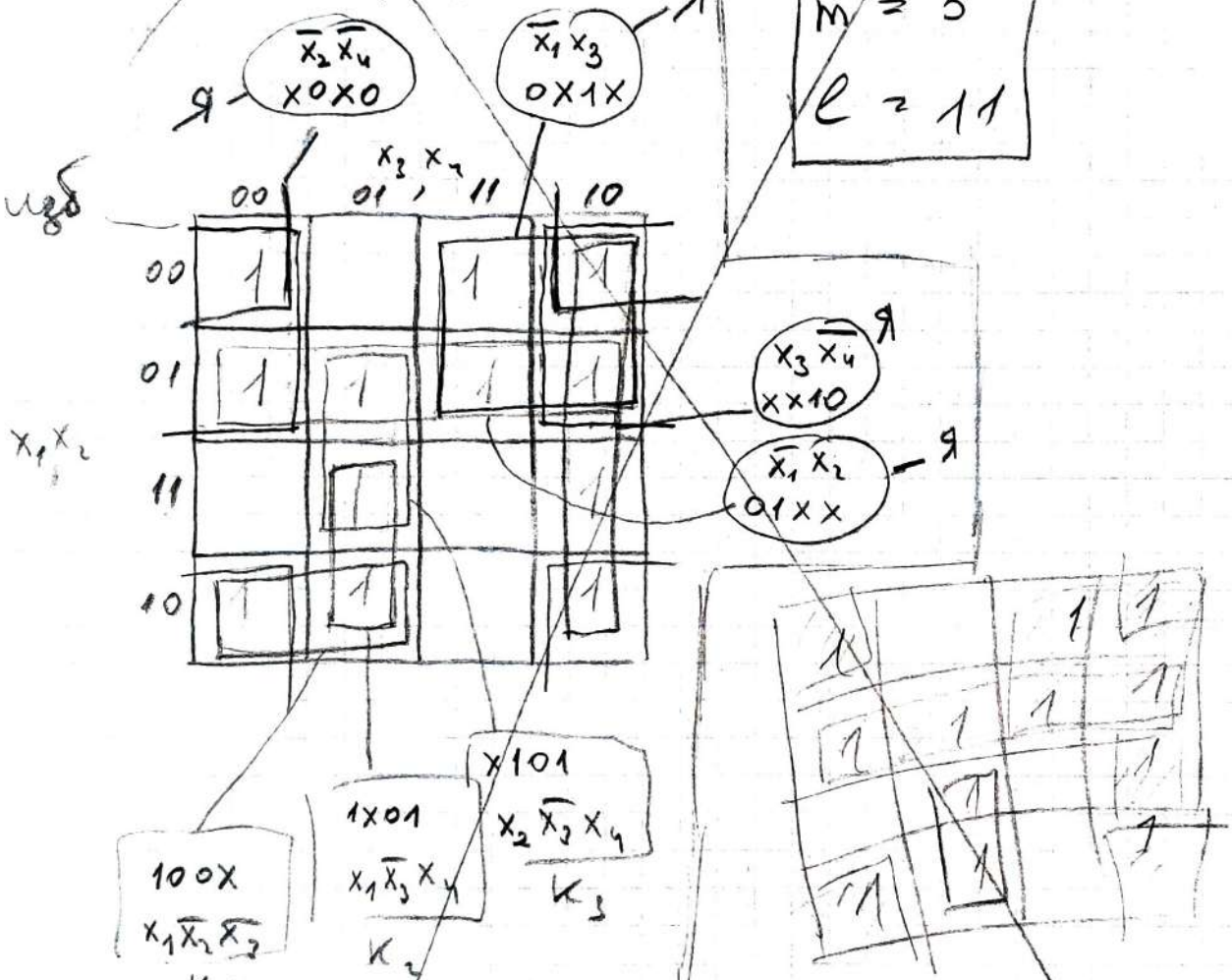
Типовая ДНФ:

$f = \bar{x}_2\bar{x}_4 \vee \bar{x}_1 x_3 \vee x_3\bar{x}_4 \vee \bar{x}_1 x_2 \vee$

$\vee \begin{cases} x_1\bar{x}_2 x_4 \vee x_2\bar{x}_3 x_4 \\ x_1\bar{x}_3 x_4 - \text{лишн.} \end{cases}$

$m = 5$

$\ell = 11$



а) Сокращенная ДНФ:

$f = \bar{x}_2\bar{x}_4 \vee \bar{x}_1 x_3 \vee x_3\bar{x}_4 \vee \bar{x}_1 x_2 \vee x_2\bar{x}_3 x_4 \vee x_1\bar{x}_3 x_4 \vee$

$\vee x_1\bar{x}_2\bar{x}_3$

б) Ядро сокращенной $\bar{x}_1 x_2$ и $x_3\bar{x}_4$

в) Функция Патрика:

$(K_1 \vee K_2)(K_2 \vee K_3) = K_1K_2 \vee K_1K_3 \vee K_2 \vee K_2K_3$

$= K_1K_3 \vee K_2$

АЛ №2

$$f = ((\overset{0}{x_2} \to \overset{1}{(x_1 \oplus x_3)}) \oplus \overset{1}{(\overset{1}{\overline{x_2}} \sim \overset{0}{x_3})}) \to (\overset{1}{\overline{x_2}} \mid \overset{1}{\overline{x_3}})$$

[redacted]

$$w = (1, 1, 0, 1, 0, 1, 1, 1)$$

$$\overline{\overline{x_2} \cdot \overline{x_3}} = x_2 \lor x_3$$

[redacted]

а)

x_1	x_2	x_3	f	w	g
0	0	0	0	1	0
0	0	1	1	1	0
0	1	0	1	0	0
0	1	1	1	1	1
1	0	0	0	0	0
1	0	1	1	1	0
1	1	0	1	1	0
1	1	1	1	1	0

T_0	T_1	S	M	L
+	+	−	+	−
−	+	−	−	−

M – ?

Схема неполна (обе ф-ии сохр 1)

б) f:

x_1 \ x_2x_3	00	01	11	10
0		1	1	1
1		1	1	1

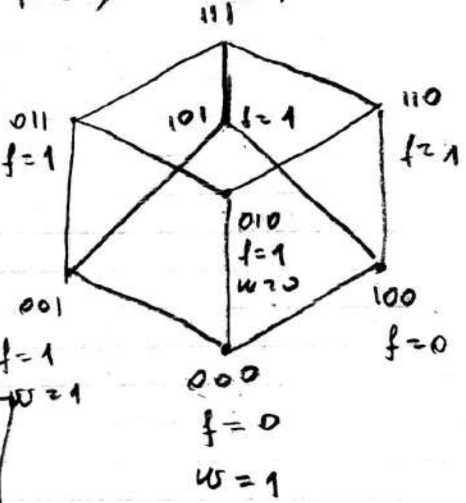
x x 1 — x 1 x

$x_3 \lor x_2$

w:

	00	01	11	10
0	1	1	1	
1		1	1	1

$x_3 \lor \overline{x_1}\,\overline{x_2} \lor x_1 x_2$



f

$a_0 = f(0,0,0) = 0$

$f(1,0,0) = 0 = a_1 \oplus a_0 \Rightarrow a_1 = 0$

$f(0,1,0) = 1 = a_2 \oplus a_0 \Rightarrow a_2 = 1$

$f(0,0,1) = 1 = a_3 \oplus a_0 \Rightarrow a_3 = 1$

$f(1,1,0) = 1 = a_{12} \oplus a_1 \oplus a_2 \oplus a_0 \Rightarrow a_{12} = 0$

$f(1,0,1) = 1 = a_{13} \oplus a_1 \oplus a_3 \oplus a_0 \Rightarrow a_{13} = 0$

$f(0,1,1) = 1 = a_{23} \oplus a_2 \oplus a_3 \oplus a_0 \Rightarrow a_{23} = 1$

$f(1,1,1) = 1 = a_{123} \oplus 0 \oplus 0 \oplus 1 \oplus 1 \oplus 1 \oplus 0 \oplus 0 + 0 \Rightarrow a_{123} = 0$

$$f = x_2 x_3 \oplus x_3 \oplus x_2$$

$a_0 = w(0,0,0) = 1$

$w(1,0,0) = 0 = a_1 \oplus a_0 \Rightarrow a_1 = 1$
$w(0,1,0) = 0 = a_2 \oplus a_0 \Rightarrow a_2 = 1$
$w(0,0,1) = 1 = a_3 \oplus a_0 \Rightarrow a_3 = 0$
$w(1,1,0) = 1 = a_{12} \oplus 1 \oplus 1 \oplus 1 \Rightarrow a_{12} = 0$
$w(1,0,1) = 1 = a_{13} \oplus 1 \oplus 0 \oplus 1 \Rightarrow a_{13} = 1$
$w(0,1,1) = 1 = a_{23} \oplus 1 \oplus 0 \oplus 1 \Rightarrow a_{23} = 1$
$w(1,1,1) = 1 = a_{123} \oplus 1 \oplus 1 \oplus 0 \oplus 0 \oplus 1 \oplus 1 \oplus 1$

$a_{123} = 0$

$$w = x_2 x_3 \oplus x_1 x_3 \oplus x_2 \oplus x_1 \oplus 1$$

B)

	T_0	T_1	S	M	L
f	+	+	−	+	−
w	−	+	−	−	−
g	+	−	−	−	−

$g = (0\,\underline{0}\,\underline{0}\,\underline{1}\,\underline{0}\,\underline{0}\,\underline{0}\,0)$

00
01
10
11

$a_0 = g(0,0,0) = 0$

$g(1,0,0) = a_1 \oplus a_0 = 0 \Rightarrow a_1 = 0$
$g(0,1,0) = a_2 \oplus a_0 = 0 \Rightarrow a_2 = 0$
$g(0,0,1) = a_3 \oplus a_0 = 0 \Rightarrow a_3 = 0$

$g(1,1,0) = a_{12} \oplus a_1 \oplus a_2 \oplus a_0 = 0 \Rightarrow a_{12} = 0$
$g(1,0,1) = a_{13} \oplus a_1 \oplus a_3 \oplus a_0 = 0 \Rightarrow a_{13} = 0$
$g(0,1,1) = a_{23} \oplus a_2 \oplus a_3 \oplus a_0 = 1 \Rightarrow a_{23} = 1$
$g(1,1,1) = a_{123} \oplus a_{12} \oplus a_{13} \oplus a_{23} \oplus a_1 \oplus a_2 \oplus a_3 \oplus a_0 = 0 \Rightarrow$
$\Rightarrow a_{123} = 1$

$$g = x_1 x_2 x_3 \oplus x_2 x_3$$

$$x \vee y = f(0, x, y) = f(g(x,x,x), x, y)$$

$$x \wedge y = g(0, x, y) = g(g(x,x,x), x, y)$$

$$\overline{x} = w(x, 0, 0) = w(x, g(x,x,x), g(x,x,x))$$

$$0 = g(x, x, x)$$

$$1 = w(x, x, x)$$