

PM – 25

В – 140 Таджибаев Завкиддин

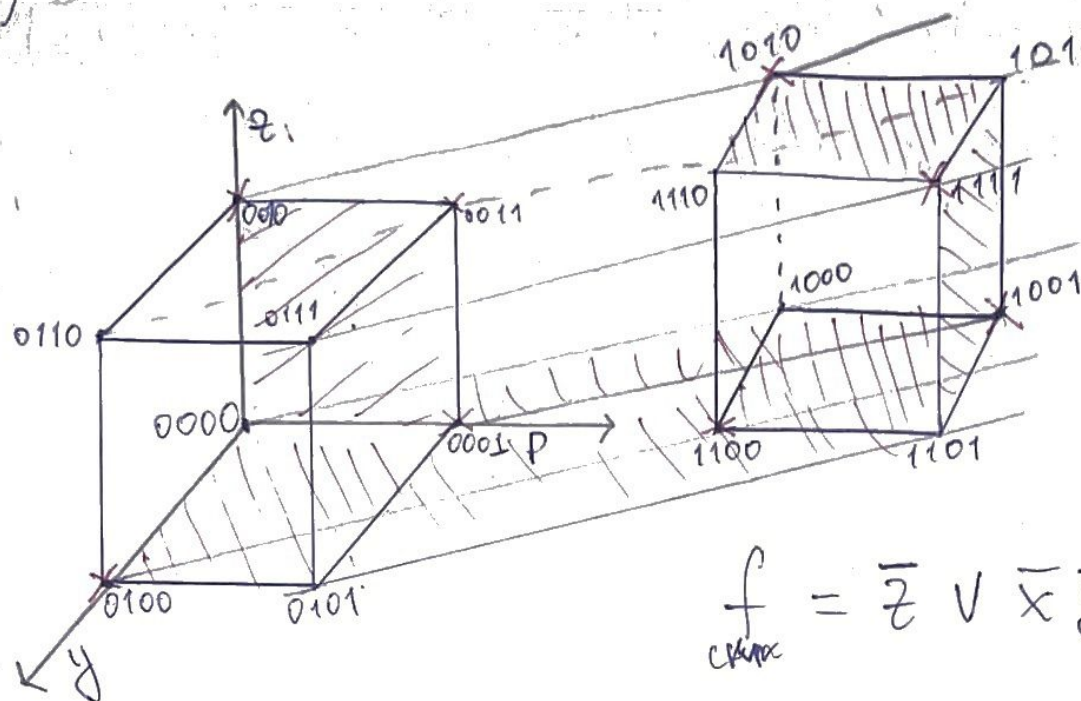
[illegible]

B-140

$$1) f(x, y, z, p) = p \Rightarrow \bar{x} \wedge z \vee y \downarrow p \leftarrow z/x \Leftrightarrow z \oplus y$$

[illegible]

2)



$$f = \bar{z} \vee \bar{x} \bar{y} \vee x z$$

$$3) C D H \varphi = \bar{p} \bar{x} \bar{y} z \vee \bar{p} \bar{x} y \bar{z} \vee \bar{p} x \bar{y} z \vee \bar{p} x y \bar{z} \vee p \bar{x} \bar{y} \bar{z} \vee p \bar{x} y z \vee p x \bar{y} \bar{z} \vee p x y z$$

$$C K H \varphi = (p \vee x \vee y \vee z) \wedge (p \vee x \vee \bar{y} \vee \bar{z}) \wedge (p \vee \bar{x} \vee y \vee z) \wedge (p \vee \bar{x} \vee \bar{y} \vee \bar{z}) \wedge (\bar{p} \vee x \vee y \vee z) \wedge (\bar{p} \vee x \vee \bar{y} \vee \bar{z}) \wedge (\bar{p} \wedge x \wedge y \wedge z) \wedge (\bar{p} \wedge x \wedge \bar{y} \wedge \bar{z})$$

4)

$$\begin{aligned}
 4) \quad & p \Rightarrow \bar{x} \wedge z \vee y \downarrow p \leftarrow z/x \Leftrightarrow z \oplus y \equiv \\
 & (p \Rightarrow \bar{x} \wedge z \vee y \downarrow p \leftarrow z/x) \wedge (z \oplus y) \vee (\overline{p \Rightarrow \bar{x} \wedge z \vee y \downarrow p \leftarrow z/x}) \wedge (\overline{z \oplus y}) \equiv \\
 & \equiv (\bar{p} \vee [\bar{x} \wedge z \vee y \downarrow p \leftarrow z/x]) \wedge (z \oplus y) \vee (p \wedge [\bar{x} \wedge z \vee y \downarrow p \leftarrow z/x]) \wedge (\overline{z \oplus y}) \equiv \\
 & \wedge (z \oplus y) \equiv (\bar{p} \vee [\bar{x} \wedge z \vee x \bar{y} z \bar{p}]) \wedge (z \oplus y) \vee (p \wedge [\bar{x} \wedge z \vee x \bar{y} z \bar{p}]) \wedge (\overline{z \oplus y}) \equiv \\
 & \wedge (z \oplus y) \equiv (\bar{p} \vee \bar{x} z) \wedge (z \oplus y) \vee (p \wedge (x \vee \bar{z}) \wedge (\bar{x} \vee y \vee \bar{z} \vee p)) \wedge (\overline{z \oplus y}) \equiv \\
 & \wedge (z \oplus y) \equiv (\bar{p} \bar{z} y \vee \bar{p} z \bar{y} \vee \bar{x} z \bar{z} y \vee \bar{x} z z \bar{y}) \vee (p x \bar{x} \vee p x y \vee p x \bar{z} \vee \\
 & p x p \vee p \bar{x} \bar{x} \vee p \bar{x} y \vee p \bar{x} \bar{z} \vee p \bar{z} p) \wedge (z \oplus y) \equiv (\bar{p} \bar{z} y \vee \bar{p} z \bar{y} \vee \\
 & \vee \bar{x} \bar{y} z) \vee (p x y \vee p x \bar{z} \vee p x \vee p \bar{x} \bar{z} \vee p \bar{x} y \vee p \bar{z} \vee p \bar{z}) \wedge (z \oplus y) \equiv \\
 & \equiv \bar{p} \bar{z} y \vee \bar{p} z \bar{y} \vee \bar{x} \bar{y} z \vee p x y z \vee p x y \bar{z} \vee p x \bar{z} z y \vee p x \bar{z} \bar{z} \bar{y} \vee \\
 & \vee p x z y \vee p x \bar{z} \bar{y} \vee p \bar{x} \bar{z} z y \vee p \bar{x} \bar{z} \bar{z} \bar{y} \vee p \bar{z} z y \vee p \bar{z} \bar{z} \bar{y} \equiv \\
 & \equiv \bar{p} \bar{z} y \vee \bar{p} z \bar{y} \vee \bar{x} \bar{y} z \vee p x y z \vee p x \bar{z} \bar{y} \vee p \bar{x} \bar{y} \bar{z} \vee p \bar{z} \bar{y} \equiv \\
 & \equiv p \bar{z} \bar{y} \vee p x y z \vee p \bar{x} \bar{y} \bar{z} \vee \bar{p} \bar{z} y \vee \bar{p} z \bar{y} \vee \bar{x} \bar{y} z \equiv \\
 & \text{DНФ} \equiv \bar{p} \bar{z} \bar{y} \vee p x y z \vee \bar{p} \bar{z} \bar{y} \vee \bar{x} \bar{y} z \vee \bar{p} \bar{z} \bar{y}
 \end{aligned}$$

x, y, z, p	f	$\bar{p} \bar{z} \bar{y}$	$\bar{p} \bar{z} y$	$\bar{x} \bar{y} z$	$p x y z$	$\bar{p} z \bar{y}$
0 0 0 1	1	1				
0 0 1 0	1			1		1
0 0 1 1	1			1		
0 1 0 0	1		1			
1 0 0 1	1	1				
1 0 1 0	1					1
1 1 0 0	1		1			
1 1 1 1	1				1	

$$f_{\text{нф}}(x, y, z, p) = \bar{p} \bar{z} \bar{y} \vee \bar{p} \bar{z} y \vee \bar{x} \bar{y} z \vee p x y z \vee \bar{p} z \bar{y}$$

$$5) f_{\text{суп}} = \bar{p} \bar{x} \bar{y} z \vee \bar{p} \bar{x} y \bar{z} \vee \bar{p} x \bar{y} z \vee \bar{p} x y \bar{z} \vee p \bar{x} \bar{y} \bar{z} \vee p \bar{x} y z \vee p x \bar{y} \bar{z} \vee p x y z$$

$1-2$ $2-3$ $3-4$ $4-5$ $5-6$ $p \bar{x} \bar{y}$ $6-7$ $7-8$
 $1-3$ $\bar{p} \bar{y} z$ $2-4$ $\bar{p} y \bar{z}$ $3-5$ $4-6$ $5-7$ $p \bar{y} \bar{z}$ $6-8$
 $1-4$ $2-5$ $3-6$ $4-7$
 $1-5$ $2-6$ $3-7$
 $1-6$ $\bar{x} \bar{y} z$ $2-7$
 $1-7$ $2-8$
 $1-8$

Проведем сокращения получим:

$$\bar{p} \bar{y} z \vee \bar{x} \bar{y} z \vee \bar{p} y \bar{z} \vee p \bar{x} \bar{y} \vee p \bar{y} \bar{z} \vee p x y z$$

$1-2$ $2-3$ $3-4$ $4-5$ $5-6$
 $1-3$ $2-4$ $3-5$ $4-6$
 $1-4$ $2-5$ $3-6$
 $1-5$ $2-6$
 $1-6$

$$f_{\text{суп}} = \bar{p} \bar{y} z \vee \bar{x} \bar{y} z \vee \bar{p} y \bar{z} \vee p \bar{x} \bar{y} \vee p \bar{y} \bar{z} \vee p x y z$$

Построим матрицу Квайна

0	$\bar{p} \bar{x} \bar{y} z$	$\bar{p} x \bar{y} \bar{z}$	$\bar{p} x \bar{y} z$	$\bar{p} x y \bar{z}$	$p \bar{x} \bar{y} \bar{z}$	$p \bar{x} \bar{y} z$	$p x \bar{y} \bar{z}$	$p x y z$
$\bar{p} \bar{y} z$	1		1					
$\bar{x} \bar{y} z$	1					1		
$\bar{p} y \bar{z}$		1		1				
$p \bar{x} \bar{y}$					1	1		
$p \bar{y} \bar{z}$					1		1	
$p x y z$								1

Функция f имеет 2 минимальных слагаемых

$$f_1 = \bar{p} \bar{y} z \vee \bar{p} y \bar{z} \vee p \bar{x} \bar{y} \vee p \bar{y} \bar{z} \vee p x y z$$

$$f_2 = \bar{p} \bar{y} z \vee \bar{x} \bar{y} z \vee \bar{p} y \bar{z} \vee p \bar{y} \bar{z} \vee p x y z$$

Таблица истинности для $f_1(x, y, z, p)$

x	y	z	p	$\bar{p} \bar{y} z$	$\bar{p} y \bar{z}$	$p \bar{x} \bar{y}$	$p y \bar{z}$	$p x y z$	R
0	0	0	0						0
0	0	0	1			1			1
0	0	1	0	1			1		1
0	0	1	1			1			1
0	1	0	0		1				1
0	1	0	1						0
0	1	1	0						0
0	1	1	1						0
1	0	0	0						0
1	0	0	1						0
1	0	1	0	1			1		1
1	0	1	1						1
1	1	0	0		1				0
1	1	0	1						1
1	1	1	0						0
1	1	1	1					1	1

Таблица истинности для $f_2(x, y, z, p)$

x	y	z	p	$\bar{p} \bar{y} z$	$\bar{x} \bar{y} z$	$\bar{p} y \bar{z}$	$p y \bar{z}$	$p x y z$	R
0	0	0	0						0
0	0	0	1				1		1
0	0	1	0	1	1				1
0	0	1	1		1				1
0	1	0	0			1			1
0	1	0	1						0
0	1	1	0						0
0	1	1	1						0
1	0	0	0						0
1	0	0	1				1		1
1	0	1	0	1					1
1	0	1	1						0
1	1	0	0			1			1
1	1	0	1						0
1	1	1	0						0
1	1	1	1					1	1

$$6) f = p^1 \bar{x}^2 \bar{y}^3 \vee p^2 x^3 y^4 \bar{z}^5 \vee \bar{p}^1 \bar{z}^2 \bar{y}^3 \vee \bar{x}^4 \bar{y}^5 z^6 \vee \bar{p}^5 \bar{x}^6 y^7 \vee p^6 \bar{x}^7 \bar{y}^8 \bar{z}^9$$

$1-2 -$ $2-3 -$ $3-4 -$ $4-5 -$ $5-6$
 $1-3 -$ $2-4 -$ $3-5 -$ $4-6$
 $1-4 -$ $2-5 -$ $3-6$
 $1-5 -$
 $1-6 - p \bar{x} \bar{y}$

После сокращения получим

$$f = p \bar{x} \bar{y} \vee p x y \bar{z} \vee \bar{p} \bar{z} \bar{y} \vee \bar{x} \bar{y} z \vee \bar{p} \bar{x} y$$

$1-2 -$ $2-3 -$ $3-4 -$ $4-5 -$
 $1-3 -$ $2-4 -$ $3-5$
 $1-4 -$ $2-5 -$
 $1-5 -$

$$f_{\text{сопр}} = p \bar{y} \bar{z} \vee p x y \bar{z} \vee \bar{p} \bar{z} \bar{y} \vee \bar{x} \bar{y} z \vee \bar{p} \bar{x} y$$

Построим матрицу Квайна:

0	$p \bar{x} \bar{y}$	$p x y \bar{z}$	$\bar{p} \bar{z} \bar{y}$	$\bar{x} \bar{y} z$	$\bar{p} \bar{x} y$	$p \bar{x} \bar{y} \bar{z}$
$p \bar{y} \bar{z}$	1					1
$p x y \bar{z}$		1				
$\bar{p} \bar{z} \bar{y}$			1			
$\bar{x} \bar{y} z$				1		
$\bar{p} \bar{x} y$					1	

$$f_{\text{минор}} = p \bar{y} \bar{z} \vee p x y \bar{z} \vee \bar{p} \bar{z} \bar{y} \vee \bar{x} \bar{y} z \vee \bar{p} \bar{x} y$$

$$⑥ f_{\text{кон}} = p \bar{z} \bar{y} \vee p \bar{x} y z \vee \bar{p} z \bar{y} \vee \bar{x} \bar{y} z \vee \bar{p} \bar{z} y \vee p \bar{x} \bar{y} \bar{z}$$

$$1-4 \quad p \bar{x} \bar{y} - 1$$

$$3-4 \quad \bar{x} \bar{y} z$$

~~по правилу~~

После минимизации:

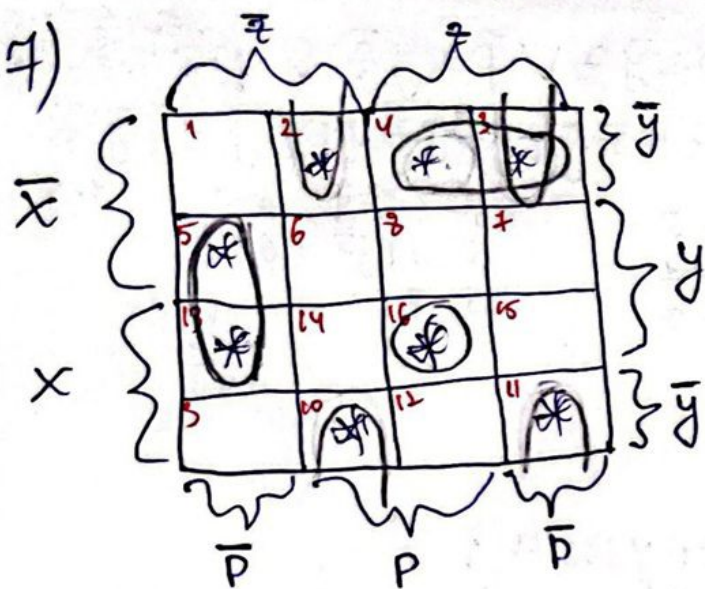
$$\text{кон. Д. Д. } p \bar{z} \bar{y} \vee p \bar{x} y z \vee \bar{p} z \bar{y} \vee \bar{x} \bar{y} z \vee \bar{p} \bar{z} y \vee p \bar{x} \bar{y}$$

	$\bar{p} \bar{x} \bar{y} z$	$\bar{p} \bar{x} y \bar{z}$	$\bar{p} x \bar{y} z$	$\bar{p} x y \bar{z}$	$p \bar{x} \bar{y} \bar{z}$	$p \bar{x} \bar{y} z$	$p x \bar{y} \bar{z}$	$p x y z$
$p \bar{z} \bar{y}$					+			+
$p \bar{x} y z$								
$\bar{p} z \bar{y}$	+		+			+		
$\bar{x} \bar{y} z$	+			+				
$\bar{p} \bar{z} y$		+			+	+		
$p \bar{x} \bar{y}$								

$$f_{\text{кон}} : p \bar{z} \bar{y} \vee p \bar{x} y z \vee \bar{p} z \bar{y} \vee \bar{x} \bar{y} z \vee \bar{p} \bar{z} y ;$$

$$p \bar{z} \bar{y} \vee p \bar{x} y z \vee \bar{p} z \bar{y} \vee \bar{p} \bar{z} y \vee p \bar{x} \bar{y} .$$

7)



$$f = (0 \ 1 \ 1 \ 1 \ 1 \ 0 \ 0 \ 0 \ 0 \ 1 \ 1 \ 0 \ 1 \ 0 \ 0 \ 1)$$

$$f = pxy\bar{z} \vee \bar{p}y\bar{z} \vee p\bar{y}\bar{z} \vee x\bar{y}z \vee \bar{p}\bar{y}z$$

N=8

$$f = (0111 \quad 1000 \quad 0110 \quad 1001)$$

$$f \in P_0, \text{ т.к. } f(0000) = 0$$

$$f \in P_1, \text{ т.к. } f(1111) = 1$$

$$f \notin S, \text{ т.к. } f(0011) = f(1100)$$

$$f \notin M, \text{ т.к. } f(0001) > f(0101)$$

$$f \notin L, \text{ т.к. минимизация}$$

$$f_{\text{СДНФ}} = \bar{p}\bar{x}\bar{y}z \vee \bar{p}\bar{x}y\bar{z} \vee \bar{p}x\bar{y}z \vee \bar{p}xy\bar{z} \vee p\bar{x}\bar{y}\bar{z} \vee$$

$$p\bar{x}\bar{y}z \vee p\bar{x}y\bar{z} \vee pxy\bar{z} \equiv \bar{p}\bar{x}\bar{y}z \oplus \bar{p}\bar{x}y\bar{z} \oplus \bar{p}x\bar{y}z \oplus$$

$$p\bar{x}\bar{y}z \oplus p\bar{x}y\bar{z} \oplus pxy\bar{z} \equiv \bar{p}\bar{x}\bar{y}z \oplus \bar{p}\bar{x}y\bar{z} \oplus \bar{p}x\bar{y}z \oplus$$

$$p\bar{x}\bar{y}z \oplus p\bar{x}y\bar{z} \oplus pxy\bar{z} \equiv \bar{p}\bar{x}\bar{y}z \oplus \bar{p}\bar{x}y\bar{z} \oplus \bar{p}x\bar{y}z \oplus$$

$$p\bar{x}\bar{y}z \oplus p\bar{x}y\bar{z} \oplus pxy\bar{z} \equiv \bar{p}\bar{x}\bar{y}z \oplus \bar{p}\bar{x}y\bar{z} \oplus \bar{p}x\bar{y}z \oplus$$

$$p\bar{x}\bar{y}z \oplus p\bar{x}y\bar{z} \oplus pxy\bar{z} \equiv \bar{p}\bar{x}\bar{y}z \oplus \bar{p}\bar{x}y\bar{z} \oplus \bar{p}x\bar{y}z \oplus$$

$$p\bar{x}\bar{y}z \oplus p\bar{x}y\bar{z} \oplus pxy\bar{z} \equiv \bar{p}\bar{x}\bar{y}z \oplus \bar{p}\bar{x}y\bar{z} \oplus \bar{p}x\bar{y}z \oplus$$

$$p\bar{x}\bar{y}z \oplus p\bar{x}y\bar{z} \oplus pxy\bar{z} \equiv \bar{p}\bar{x}\bar{y}z \oplus \bar{p}\bar{x}y\bar{z} \oplus \bar{p}x\bar{y}z \oplus$$

$$p\bar{x}\bar{y}z \oplus p\bar{x}y\bar{z} \oplus pxy\bar{z} \equiv \bar{p}\bar{x}\bar{y}z \oplus \bar{p}\bar{x}y\bar{z} \oplus \bar{p}x\bar{y}z \oplus$$

$$p\bar{x}\bar{y}z \oplus p\bar{x}y\bar{z} \oplus pxy\bar{z} \equiv \bar{p}\bar{x}\bar{y}z \oplus \bar{p}\bar{x}y\bar{z} \oplus \bar{p}x\bar{y}z \oplus$$

$$p\bar{x}\bar{y}z \oplus p\bar{x}y\bar{z} \oplus pxy\bar{z} \equiv \bar{p}\bar{x}\bar{y}z \oplus \bar{p}\bar{x}y\bar{z} \oplus \bar{p}x\bar{y}z \oplus$$

$$p\bar{x}\bar{y}z \oplus p\bar{x}y\bar{z} \oplus pxy\bar{z} \equiv \bar{p}\bar{x}\bar{y}z \oplus \bar{p}\bar{x}y\bar{z} \oplus \bar{p}x\bar{y}z \oplus$$

$$p\bar{x}\bar{y}z \oplus p\bar{x}y\bar{z} \oplus pxy\bar{z} \equiv \bar{p}\bar{x}\bar{y}z \oplus \bar{p}\bar{x}y\bar{z} \oplus \bar{p}x\bar{y}z \oplus$$

$$p\bar{x}\bar{y}z \oplus p\bar{x}y\bar{z} \oplus pxy\bar{z} \equiv \bar{p}\bar{x}\bar{y}z \oplus \bar{p}\bar{x}y\bar{z} \oplus \bar{p}x\bar{y}z \oplus$$

$$p\bar{x}\bar{y}z \oplus p\bar{x}y\bar{z} \oplus pxy\bar{z} \equiv \bar{p}\bar{x}\bar{y}z \oplus \bar{p}\bar{x}y\bar{z} \oplus \bar{p}x\bar{y}z \oplus$$

N=8

f

P ₀	f
P ₁	f
S	-
M	-
L	-

$f(x, y, z, p)$ - аналитическая запись функции
 по которой можно получить P₀ и P₁
 и не монотонна и не линейна:
 $f(0001) > f(0101)$
 $f \notin L$

N=8

$$f = (0111 \quad 1000 \quad 0110 \quad 1001)$$

$$f \in P_0, \text{ м.к. } f(0000) = 0$$

$$f \in P_1, \text{ м.к. } f(1111) = 1$$

$$f \notin S, \text{ м.к. } f(0011) = f(1100)$$

$$f \notin M, \text{ м.к. } f(0001) \neq f(0101)$$

$$\begin{aligned} f_{\text{СНФ}} &= \bar{p} \bar{x} \bar{y} z \vee \bar{p} \bar{x} y \bar{z} \vee \bar{p} x \bar{y} z \vee \bar{p} x y \bar{z} \vee p \bar{x} \bar{y} \bar{z} \vee \\ & p \bar{x} \bar{y} z \vee p x \bar{y} \bar{z} \vee p x y z \equiv (p+1)(x+1)(y+1)z \oplus (p+1)(x+1)y \cdot \\ & \cdot (z+1) \oplus (p+1)(y+1)xz + (p+1)(z+1)xy + (x+1)(y+1)(z+1)p \oplus \\ & \oplus (x+1)(y+1)pz \oplus (y+1)(z+1)px \oplus pxyz \equiv 8pxyz \oplus 5pxz \oplus \\ & \oplus 4pyz \oplus 3pz \oplus 4xyz \oplus 2xz \oplus 2yz \oplus z \oplus 4pxy \oplus 2py \oplus y \oplus 2px \oplus p \\ & \equiv p x z \oplus p z \oplus y \oplus p \oplus z. \end{aligned}$$

$f \notin L$, м.к. степень полинома Алчарикита первы-
вывает (1).

N=8

	P_0	P_1	S	M	L
f	+	+	-	-	-
f'	-	-	+	-	+

$$f(x, y, z, p) = (0111 \quad 1000 \quad 0110 \quad 1001)$$

$$f'(x', y', z', p') = (1111 \quad 1111 \quad 00000000)$$

$$\text{База: } \{f, f'\}$$