

Логический раздел.

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VI

$$((P \rightarrow Q) \wedge (R \rightarrow S) \wedge \neg(Q \vee S)) \rightarrow \neg(P \vee R)$$

P	Q	R	S	F
0	0	0	0	1
0	0	0	1	0
0	0	1	0	1
0	0	1	1	0
0	1	0	0	1
0	1	0	1	0
0	1	1	0	1
0	1	1	1	0
1	0	0	0	1
1	0	0	1	0
1	0	1	0	1
1	0	1	1	0
1	1	0	0	1
1	1	0	1	0
1	1	1	0	1
1	1	1	1	0

Трехзначная функция  
изменяется наименее, так  
как минимальное значение 1 на  
бен недостаточен.

Ее выражение в виде  
суммы произведений.

$$f(A, B, C, D) = \overline{A + B + C + D}(\overline{A} + C + BD)(C + \bar{D})$$

A	B	C	D	F
0	0	0	0	0 $m_0$
0	0	0	1	0 $m_1$
0	0	1	0	0 $m_2$
0	0	1	1	0 $m_3$
0	1	0	0	0 $m_4$
0	1	0	1	0 $m_5$
0	1	1	0	0 $m_6$
0	1	1	1	0 $m_7$
1	0	0	0	1 $m_8$ ( $\overline{A + B + C + D})(\overline{A + B + C + \bar{D}})(\overline{A + B + \bar{C} + D})$ )
1	0	0	1	0 $m_9$
1	0	1	0	1 $m_{10}$ ( $\overline{A + B + \bar{C} + D})(\overline{A + \bar{B} + C + D})(\overline{A + \bar{B} + C + \bar{D}})$ )
1	0	1	1	1 $m_{11}$

CR & CP

$$\overline{A}\overline{B}\overline{C}\overline{D} + \overline{A}\overline{B}C\bar{D} + \overline{A}\overline{B}CD + \overline{A}B\bar{C}\bar{D} +$$

$$\overline{A}BC\bar{D} + ABCD$$

CK & CP

$$(\overline{A} + B + C + D)(\overline{A} + B + C + \bar{D})(\overline{A} + B + \bar{C} + D).$$

$$(\overline{A} + B + \bar{C} + D)(\overline{A} + \bar{B} + C + D)(\overline{A} + \bar{B} + C + \bar{D}).$$

$$\begin{array}{|c|c|c|c|c|c|} \hline A & B & C & D & E & F \\ \hline 1 & 1 & 0 & 0 & 1 & M_{12} \\ \hline 1 & 1 & 0 & 1 & 0 & M_{13} \\ \hline 1 & 1 & 1 & 0 & 1 & M_{14} \\ \hline 1 & 1 & 1 & 1 & 1 & M_{15} \\ \hline \end{array} \cdot (\bar{A} + \bar{B} + \bar{C} + D)(\bar{A} + \bar{B} + \bar{C} + \bar{D})(\bar{A} + B + C + D) \\ \cdot (\bar{A} + \bar{B} + C + \bar{D})$$

A	B	C	D	E	F
0	0	0	0	0	0
0	0	0	0	1	0
0	0	0	1	0	0
0	0	0	1	1	0
0	0	1	0	0	0
0	0	1	0	1	0
0	0	1	1	0	0
0	1	0	0	0	0
0	1	0	0	1	0
0	1	0	1	0	0
0	1	0	1	1	0
0	1	1	0	0	0
0	1	1	0	1	0
0	1	1	1	0	0
0	1	1	1	1	0
0	1	1	0	0	1
0	1	1	0	1	1
0	1	1	1	0	0
0	1	1	1	0	1
0	1	1	1	1	0
0	1	1	0	0	1
0	1	1	0	1	1
0	1	1	1	0	1
0	1	1	1	1	1
1	0	0	0	0	1
1	0	0	0	1	1
1	0	0	1	0	1
1	0	0	1	1	1
1	0	1	0	0	1
1	0	1	0	1	1
1	0	1	1	0	1
1	0	1	1	1	1
1	1	0	0	1	1
1	1	0	0	1	0
1	1	0	1	0	1
1	1	0	1	1	1
1	1	1	0	0	1
1	1	1	0	1	0
1	1	1	1	0	1
1	1	1	1	1	0
1	1	1	1	1	1

C & K QP

$$\begin{aligned} & \bar{A} \bar{B} \bar{C} \bar{D} \bar{E} + \bar{A} \bar{B} \bar{C} \bar{D} E + \bar{A} \bar{B} C \bar{D} \bar{E} + \\ & + \bar{A} \bar{B} C \bar{D} E + \bar{A} \bar{B} C D \bar{E} + \bar{A} \bar{B} C D E + \\ & + \bar{A} B \bar{C} \bar{D} \bar{E} + A \bar{B} \bar{C} \bar{D} \bar{E} + \bar{A} B C \bar{D} \bar{E} + \\ & + \bar{A} B C \bar{D} E + \bar{A} B C D \bar{E} + \bar{A} B C D E \end{aligned}$$

C K K QP

$$\begin{aligned} & (\bar{A} + B + C + D + E)(\bar{A} + B + C + D + \bar{E}). \\ & \cdot (\bar{A} + B + C + \bar{D} + E)(\bar{A} + B + C + \bar{D} + \bar{E}). \\ & \cdot (\bar{A} + B + \bar{C} + D + E)(\bar{A} + B + \bar{C} + D + \bar{E}). \\ & \cdot (\bar{A} + B + \bar{C} + \bar{D} + E)(\bar{A} + B + \bar{C} + \bar{D} + \bar{E}). \\ & \cdot (\bar{A} + \bar{B} + C + D + E)(\bar{A} + \bar{B} + C + D + \bar{E}). \\ & \cdot (\bar{A} + \bar{B} + C + \bar{D} + E)(\bar{A} + \bar{B} + C + \bar{D} + \bar{E}). \\ & \cdot (\bar{A} + \bar{B} + \bar{C} + D + E)(\bar{A} + \bar{B} + \bar{C} + D + \bar{E}). \\ & \cdot (\bar{A} + \bar{B} + \bar{C} + \bar{D} + E)(\bar{A} + \bar{B} + \bar{C} + \bar{D} + \bar{E}). \\ & \cdot (\bar{A} + \bar{B} + C + \bar{D} + E)(\bar{A} + \bar{B} + C + \bar{D} + \bar{E}). \\ & \cdot (\bar{A} + \bar{B} + \bar{C} + C + \bar{D} + E)(\bar{A} + \bar{B} + \bar{C} + C + \bar{D} + \bar{E}). \\ & \cdot (\bar{A} + \bar{B} + \bar{C} + \bar{D} + C + E)(\bar{A} + \bar{B} + \bar{C} + \bar{D} + C + \bar{E}). \\ & \cdot (\bar{A} + \bar{B} + \bar{C} + \bar{D} + \bar{C} + E)(\bar{A} + \bar{B} + \bar{C} + \bar{D} + \bar{C} + \bar{E}). \\ & \cdot (\bar{A} + \bar{B} + \bar{C} + \bar{D} + \bar{C} + \bar{E})(\bar{A} + \bar{B} + \bar{C} + \bar{D} + \bar{C} + \bar{E}). \\ & \cdot (\bar{A} + \bar{B} + \bar{C} + \bar{D} + \bar{C} + \bar{E}) \end{aligned}$$

v3

$$F(A, B, C, D) = \sum_{k=4}^3 (4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15)$$

<u>A B C D   F</u>
0 0 0 0   0
0 0 0 1   1
0 0 1 0   2
0 0 1 1   3
0 1 0 0   4
0 1 0 1   5
0 1 1 0   6
0 1 1 1   7
1 0 0 0   8
1 0 0 1   9
1 0 1 0   10
1 0 1 1   11
1 1 0 0   12
1 1 0 1   13
1 1 1 0   14
1 1 1 1   15

0 0 0 1   1	1 1 1 1   1	1 1 1 1   1	1 1 1 1   1	1 1 1 1   1	1 1 1 1   1
0 0 0 1   1	0 1 0 1   0	1 0 1 0   1	0 1 0 1   0	1 0 1 0   1	0 1 0 1   0
0 0 0 1   1	0 0 1 0   0	1 1 0 0   0	0 0 1 0   0	1 1 0 0   0	0 0 1 0   0
0 0 0 1   1	0 0 0 1   0	1 1 1 0   0	0 0 0 1   0	1 1 1 0   0	0 0 0 1   0
0 0 0 1   1	0 0 0 0   1	1 0 0 1   1	0 0 0 0   1	1 0 0 1   1	0 0 0 0   1

A B C D | F

$$\begin{aligned} & CD \oplus B \oplus BCD \oplus A \oplus \\ & \oplus ACD \oplus AB \oplus ABCD \end{aligned}$$

0 0 0 0   0
0 0 0 1   1
0 0 1 0   1
0 0 1 1   1
0 1 0 0   0
0 1 0 1   0
0 1 1 0   1
0 1 1 1   1
1 0 0 0   0
1 0 0 1   0
1 0 1 0   0
1 0 1 1   1
1 1 0 0   0
1 1 0 1   1
1 1 1 0   0
1 1 1 1   1

<u>A B C D   F</u>
0 0 0 1   1
0 0 1 0   0
0 1 0 0   0
0 1 1 0   1
1 0 0 0   0
1 1 0 0   0
0 0 1 0   0
0 1 0 0   0
1 0 1 0   0
1 1 1 0   0
0 0 1 0   0
0 1 1 0   0

1	0	1	0	0
1	1	1	0	0
0	0	1	1	0
0	1	1	1	0
1	1	1	1	1

$C\bar{D} \oplus B \oplus BCD \oplus A \oplus \emptyset$

$\oplus \emptyset \oplus C\bar{D} \oplus AB \oplus ABCD$

v4

$$\gamma_1 = [(BC \rightarrow \bar{B}\bar{D})(\bar{C} \rightarrow D)] \oplus B \rightarrow (\bar{A}\bar{B}\bar{C} \rightarrow BC)$$

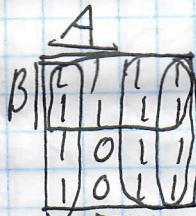
( $\bar{A}, \bar{B}, \bar{C}, D$ )

$$\gamma_2 = (0, 1, 2, 4, 5, 7, 8, 10, 11, 12, 13, 14)$$

Minn. F.S. OP

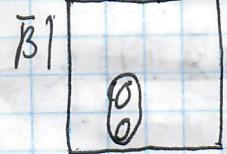
A B C D | K

0	0	0	0	1
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
0	1	0	0	1
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	1
1	0	0	1	1
1	0	1	0	0
1	0	1	0	1
1	1	0	0	1
1	1	0	0	1
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1



Minn. F.S. OP

$$\bar{C} + B + \bar{A}$$



Minn. K.R. OP

$$\bar{A} + B + \bar{C}$$

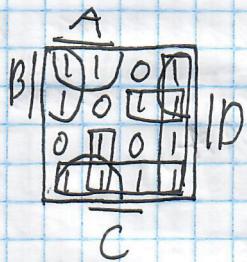
Минимизация выражения по критериям мин. F.S. OP:

$$\bar{A} - 1; B - 1; \bar{C} - 1$$

Минимизация выражения по критериям мин. K.R. OP:

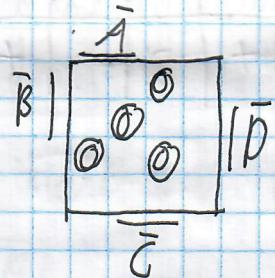
$$\bar{A} - 1; B - 1; \bar{C} - 1$$

A	B	C	D	$y_2$
0	0	0	0	0
0	0	0	1	1
0	0	1	0	2
0	0	1	1	3
0	1	0	0	4
0	1	0	1	5
0	1	1	0	6
0	1	1	1	7
1	0	0	0	8
1	0	0	1	9
1	0	1	0	10
1	0	1	1	11
1	1	0	0	12
1	1	0	1	13
1	1	1	0	14
1	1	1	1	15



Minn. J. K. QP.

$$BC + A\bar{D} + A\bar{B}C + \bar{A}\bar{B}D + \bar{B}\bar{D} + \bar{A}\bar{C}$$



Minn. K. K. QP.

$$(A + \bar{B} + \bar{C} + \bar{D})(\bar{A} + B + C + D) \cdot \\ (A + \bar{B} + \bar{C} + D)(A + B + \bar{C} + \bar{D})$$

Meno envozennéjí gne minn J. K. QP:  $B=2; \bar{C}=2;$   
 $A=2; \bar{D}=2; \bar{B}=2; C=1; \bar{A}=2; D=1;$

Meno envozennéjí gne minn K. K. QP:  $\bar{A}=2;$   
 $\bar{B}=2; \bar{C}=3; \bar{D}=3; B=2; C=1; A=2; D=1;$

$$F = \{ f_1(A, B) = A \wedge B, \\ f_2(A, B) = (A \rightarrow B) \wedge A, \\ f_3(A, B) = A \leftrightarrow B \}$$

$f_1(A, B) = A + B$	T <sub>0</sub>	T <sub>1</sub>	S	M	L
$\begin{array}{ c c } \hline A & B \\ \hline 0 & 0 \\ 0 & 1 \\ 1 & 0 \\ 1 & 1 \\ \hline \end{array} f_1$	+	+	-	+	-
$\begin{array}{ c c } \hline A & B \\ \hline 0 & 0 \\ 0 & 1 \\ 1 & 0 \\ 1 & 1 \\ \hline \end{array} f_2$	+	+	-	+	-
$\begin{array}{ c c } \hline A & B \\ \hline 0 & 0 \\ 0 & 1 \\ 1 & 0 \\ 1 & 1 \\ \hline \end{array} f_3$	-	+	-	-	+

$$\begin{array}{cccc} 0 & 1 & 1 \\ 1 & 0 & 0 \\ 1 & 0 \\ 1 \\ \hline \end{array} B \oplus A \oplus AB$$

$$f_2(A, B) = A B$$

$f_2(A, B) = A B$
$\begin{array}{ c c } \hline A & B \\ \hline 0 & 0 \\ 0 & 1 \\ 1 & 0 \\ 1 & 1 \\ \hline \end{array} f_2$

0	0	0	1
0	0	1	
0	1	0	
1	0	0	

$$AB$$

$$f_3(A, B) = A \leftrightarrow B$$

$f_3(A, B) = A \leftrightarrow B$	0	0	1	0	1	1	0
$\begin{array}{ c c } \hline A & B \\ \hline 0 & 0 \\ 0 & 1 \\ 1 & 0 \\ 1 & 1 \\ \hline \end{array} f_3$	0	1	1	0	1	0	1

$$f_4(A, B) = A \rightarrow B$$

$f_4(A, B) = A \rightarrow B$
$\begin{array}{ c c } \hline A & B \\ \hline 0 & 0 \\ 0 & 1 \\ 1 & 0 \\ 1 & 1 \\ \hline \end{array} f_4$

$f_4(A, B) = A \rightarrow B$
$\begin{array}{ c c } \hline A & B \\ \hline 1 & 0 \\ 1 & 1 \\ 0 & 0 \\ 0 & 1 \\ \hline \end{array} f_4$

$f_4(A, B) = A \rightarrow B$	T <sub>0</sub>	T <sub>1</sub>	S	M	L
$\begin{array}{ c c } \hline A & B \\ \hline 1 & 0 \\ 1 & 1 \\ 0 & 0 \\ 0 & 1 \\ \hline \end{array} f_4$	-	+	-	-	-

$$1 \oplus A \oplus AB$$

$$f_5(\emptyset, B) = \emptyset \leftarrow B$$

$\emptyset$	$B$	$f_5$
1	0	0
0	1	0
1	0	1
1	1	1

 $f_5$ 

$T_0$	$T_1$	$S$	$M$	$L$
-	+	-	-	-

 $10110$ 
  

$$\cdot 1 \oplus B \oplus \emptyset B$$

$$f_7(\emptyset, B) = (\overline{\emptyset \oplus B})$$

$\emptyset$	$B$	$f_7$
1	0	0
0	1	0
1	0	0
1	1	1

 $f_7$ 

$T_0$	$T_1$	$S$	$M$	$L$
-	+	-	-	+

 $1001$ 
  

$$1 \oplus B \oplus \emptyset$$

$$f_7(\emptyset, B) = (\overline{\emptyset \mid B})$$

$\emptyset$	$B$	$f_7$
1	0	0
0	1	0
1	0	0
1	1	1

 $f_7$ 

$T_0$	$T_1$	$S$	$M$	$L$
+	+	-	+	-

 $0001$ 
  

$$\emptyset B$$

$$f_7(\emptyset, B) = (\overline{\emptyset \vee B})$$

$\emptyset$	$B$	$f_7$
1	0	0
0	1	1
1	0	1
1	1	1

 $f_7$ 

$T_0$	$T_1$	$S$	$M$	$L$
+	+	-	+	-

 $0111$ 
  

$$B \oplus \emptyset \oplus \emptyset B$$

Последний блок означает единицу 1, а значение единиц в столбцах не являются нормой.

№6

Система: {T, V}

$$f_1(A) = A \oplus$$

A   F <sub>1</sub>	T <sub>0</sub>	T <sub>1</sub>	S	M	L	
1   0   1   0   1   0   1	F <sub>1</sub>	-	-	+	-	+
1   0   1   0   1   0   1						

$$A \oplus A$$

$$f_2(A, B) = A \vee B$$

A   B   F <sub>2</sub>	T <sub>0</sub>	T <sub>1</sub>	S	M	L	
0   0   0   0   0   0   0	F <sub>2</sub>	-	-	+	-	+
0   1   1   1   1   1   1						
1   0   1   1   1   1   1						
1   1   1   1   1   1   1						

$$B \oplus A \oplus A \vee B$$

Используя написанного выше, система оп-и {T, V} решает нормой.

Ocimo:

v7

$$\begin{aligned}f_1(A, B) &= \bar{A}(B + A) \\f_2(A, D) &= \bar{A}D \\f_3(C, D) &= \bar{C}D + D\end{aligned}$$

$$\begin{aligned}\bar{A}(B\bar{C}D + \bar{B}D) &= \bar{A}(\bar{B} + \bar{C}D + \bar{D}) = \\&= \bar{A}(\bar{B} + \bar{D} + \bar{C})\end{aligned}$$

$$F(A, B, C, D) = \bar{A}(B\bar{C}D + \bar{B}D)$$

$$f_2(CD) = CD$$

$$f_2(B, f_2(CD)) = BCD$$

$$f_1(A, \bar{A}) = \bar{A}$$

$$\begin{aligned}f_1(f_2(B, f_2(CD))), f_2(B, f_2(CD)) &= \\&= \bar{BCD}\end{aligned}$$

$$\begin{aligned}f_2(f_1(A, \bar{A}), f_1(f_2(B, f_2(CD)), \\f_2(B, f_2(CD)))) &= \bar{A}BCD = \\&= \bar{A}(\bar{B} + \bar{D} + \bar{C})\end{aligned}$$

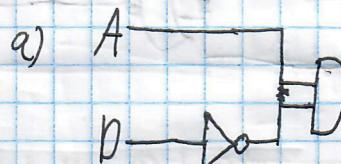
v2

$$F(A, B, C, D) = \bar{A}\bar{D}(B\bar{C} + \bar{A}\bar{D})$$

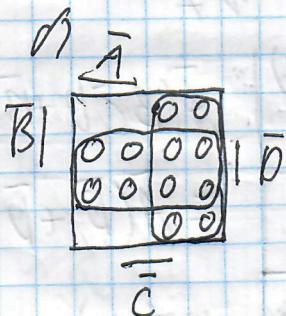
A	B	C	D	F
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	0
0	1	0	0	0
0	1	0	1	0
0	1	1	0	0
0	1	1	1	0
1	0	0	1	0
1	0	0	0	0

~~$\bar{A}B\bar{C}D + \bar{A}\bar{D}$~~

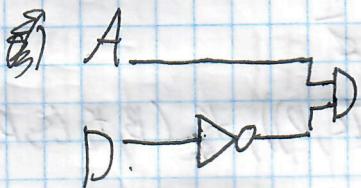
& R.Q



1	0	1	0	1
1	0	1	1	0
1	1	0	0	1
1	1	0	1	0
1	1	1	0	1
1	1	1	1	0

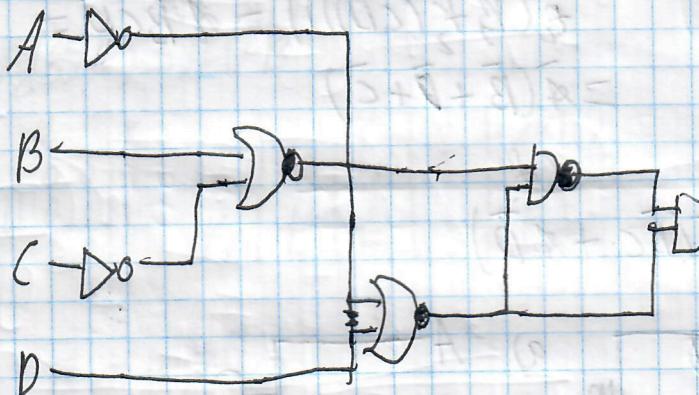


$$A \bar{D}$$



$$(A \bar{D}) \cdot ((\bar{B} \bar{C} + A \bar{D}) + (\bar{A} + D))$$

$$-- Q) (\bar{A} \downarrow D) ((B \downarrow \bar{C}) | (\bar{A} \downarrow D)) = (\cancel{A} + D) \cdot (\cancel{(\bar{B} C + A \bar{D})} \cdot (\bar{A} + D))$$

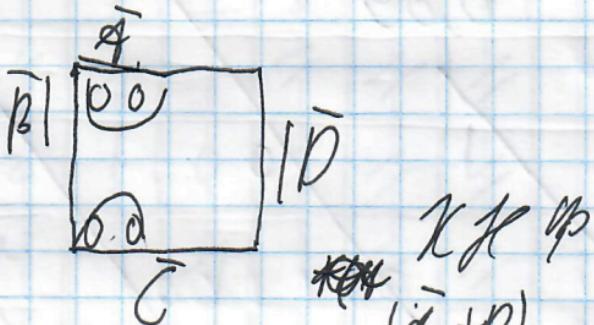


2)

A	B	C	D	F
0	0	0	0	1
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
0	1	0	0	1
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	0
1	0	0	1	1
1	0	1	0	0
1	0	1	1	1
1	1	0	0	0
1	1	0	1	1
1	1	1	0	0
1	1	1	1	1

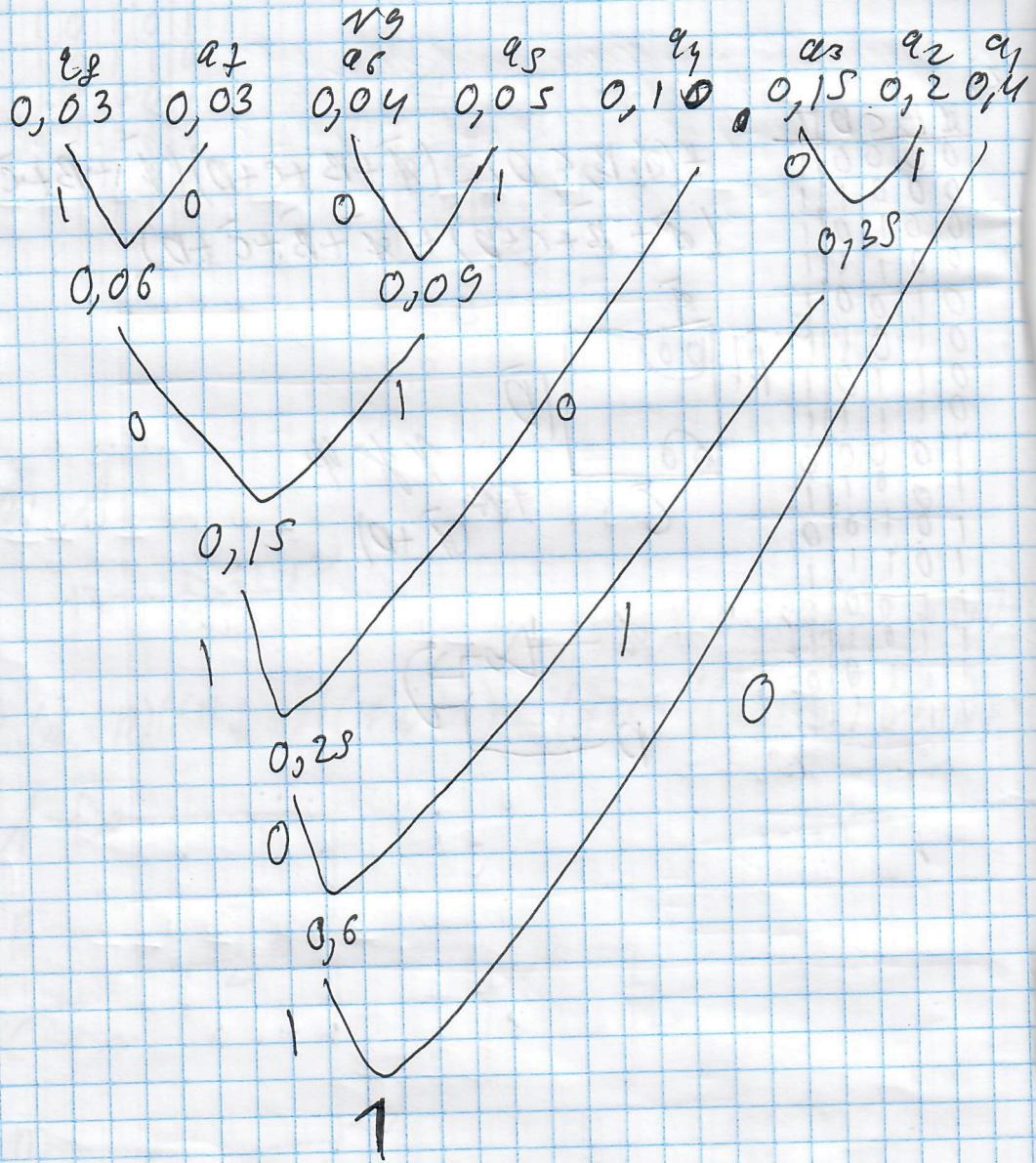
$$f(A, B, C, D) = (\bar{A} + B + C + D)(\bar{A} + B + \bar{C} + D)$$

$$(\bar{A} + \bar{B} + C + D) + (\bar{A} + \bar{B} + \bar{C} + D)$$



~~KKP~~  
~~(A + D)~~





$$q_1 = 0$$

$$q_4 = 100$$

$$q_f = 10100$$

$$q_2 = 111$$

$$q_5 = 10111$$

$$q_p = 10101$$

$$q_3 = 110$$

$$q_6 = 10110$$

$$T = 0,4 \cdot 1 + 0,2 \cdot 3 + 0,15 \cdot 3 + 0,1 \cdot 3 + 0,08 \cdot 5 + 0,04 \cdot 5 + 0,03 \cdot 5 + 0,03 \cdot 5 = 2,5$$

Symbol	P	Результат					Команда
		1	2	3	4	5	
a <sub>1</sub>	0,4	1	1	=	/	/	11
a <sub>2</sub>	0,2	1	0	/	/	/	10
a <sub>3</sub>	0,15	1	1	/	/	/	011
a <sub>4</sub>	0,10	1	0	/	=	/	010
a <sub>5</sub>	0,05	0	1	1	=	/	0011
a <sub>6</sub>	0,04	0	1	0	/	/	0010
a <sub>7</sub>	0,03	0	0	1	/	/	0001
a <sub>8</sub>	0,03	0	0	0	/	/	0000

$$T = 0,4 \cdot 2 + 0,2 \cdot 2 + 0,1 \cdot 3 + 0,15 \cdot 3 + 0,05 \cdot 4 + 0,04 \cdot 4 + 0,03 \cdot 4 + 0,03 \cdot 4 = 2,55$$

2,55 > 2,5  $\Rightarrow T$  (Надо менять) менять, землю в Рано.

110

01001

~~$$\begin{array}{r} 000 \\ \hline 1 \\ 22 \\ \hline 444 \end{array}$$

$$\begin{array}{r} 100 \\ \hline 1 \\ 22 \\ \hline 44 \end{array}$$

$$\begin{array}{r} 11 \\ \hline 22 \\ \hline 44 \end{array}$$~~

1)

0111001

~~$$\begin{array}{r} 0 \\ \hline 1 \\ 22 \\ \hline 2 \end{array}$$

$$\begin{array}{r} 1 \\ \hline 1 \\ 22 \\ \hline 2 \end{array}$$

$$\begin{array}{r} 11 \\ \hline 22 \\ \hline 2 \end{array}$$

$$\begin{array}{r} 00 \\ \hline 1 \\ 22 \\ \hline 2 \end{array}$$~~

88

01001

~~$$\begin{array}{r} 0001 \\ \hline 1 \\ 202 \\ \hline 0 \end{array}$$

$$\begin{array}{r} 1001 \\ \hline 1 \\ 202 \\ \hline 0 \end{array}$$

$$\begin{array}{r} 11 \\ \hline 22 \\ \hline 44 \end{array}$$~~

88

0111001

~~$$\begin{array}{r} 1101 \\ \hline 1 \\ 22 \\ \hline 1 \end{array}$$

$$\begin{array}{r} 1111 \\ \hline 22 \\ \hline 1 \end{array}$$

$$\begin{array}{r} 1001 \\ \hline 22 \\ \hline 1 \end{array}$$

$$8888$$~~

VVV VVVV

2)  $\begin{array}{r} XX \\ X \\ \hline 110001011 \\ \hline 222222 \\ \hline 444444 \end{array}$

$$\begin{array}{r} XX \\ X \\ \hline 100001011 \\ \hline 222222 \\ \hline 444444 \end{array}$$

$$\begin{array}{r} XX \\ X \\ \hline 1011011 \\ \hline 22222 \\ \hline 4444 \end{array}$$

$$8888$$

1)  $1 \oplus 1 \oplus 0 \oplus 1 \oplus 1 = 0 \times$

2)  $1 \oplus 0 \oplus 0 \oplus 0 \oplus 1 = 0 \times$

3)  $1 \oplus 0 \oplus 0 \oplus 1 = 1 \checkmark$

4)  $1 \oplus 0 \oplus 1 = 0 \checkmark$

1 1 0 0 1. 0 0 0 1 0 1  
1 1 2 2 1 2 2 1 2 2 1  
4444 4  
2222

- 1)  $0 \oplus 1 \oplus 0 \oplus 1 \oplus 1 = 1 \checkmark$
- 2)  $0 \oplus 0 \oplus 0 \oplus 0 \oplus 1 = 1 \checkmark$
- 3)  $1 \oplus 0 \oplus 0 \oplus 1 = 0 \checkmark$
- 4)  $1 \oplus 0 \oplus 1 = 0 \checkmark$

Outes mit 10010001011