Problema 9.3.6.5: Simplificaţi următoarele funcţii booleene de trei variabile date prin zerourile acestora, utilizând metoda lui Quine:

$$f_5(0,0,0) = f_5(1,1,0) = f_5(1,1,1) = 0$$

Metoda lui Quine se aplica formei canonice disjunctive a functiei (FCD). FCD este disjunctia mintermilor corespunzatori argumentelor pentru care functia ia valoarea 1.

m	x_1	x_2	x_3	$f_5(x)$
m_0	0	0	0	0
m_1	0	0	1	1
m_2	0	1	0	1
m_3	0	1	1	1
m_4	1	0	0	1
m_5	1	0	1	1
m_6	1	1	0	0
m_7	1	1	1	0

$f_5 = m_1 \vee m_2 \vee m_3 \vee m_4 \vee m_5$

$S_{f5} = \{(0,0,1), (0,1,0), (0,1,1), (1,0,0), (1,0,1)\}$

Ordonam multimea suport a functiei crescator dupa numarul de valori 1 continut de fiecare triplet:

$S_{f5} = \{(0,1,1), (1,0,1), (0,0,1), (0,1,0), (1,0,0)\}$

Construirea tabelei:

			x1	x2	x3	
	I	√	0	1	1	m_3
		√	1	0	1	m_5
Factorizare simpla		√	0	0	1	m_1
	I	√	0	1	0	m_2
		√	1	0	0	m_4
			0	-	1	$m_3 \vee m_1 = \overline{x_1}x_3 = max_1$
	III = I + II		0	1	-	$m_3 \vee m_2 = \overline{x_1}x_2 = max_2$
			-	0	1	$m_5 \vee m_1 = \overline{x_2}x_3 = max_3$
			1	0	-	$m_5 \vee m_4 = x_1\overline{x_2} = max_4$

Monoamele care au participat la factorizare au fost bifate, iar cele ramase nebifate sunt monoamele maximale.

$M(f_5) = \{\overline{x_1}x_3, \overline{x_1}x_2, \overline{x_2}x_3, x_1\overline{x_2}\} = \{max_1, max_2, max_3, max_4\}$

Identificarea monoamelor centrale:

Monoame maximale Mintermi	max_1	max_2	max_3	max_4
m_1	*		*	
m_2		⊕		
m_3	*	*		
m_4				⊕
m_5			*	*

Multimea monoamelor centrale este formata din monoamele care contin cel putin o steluta incercuita pe coloana.

$C(f_5) = \{max_2, max_4\}$

⇨ Ne aflam in cazul 2

Identificarea formelor simplificate:

$g(x_1, x_2, x_3) = max_2 \vee max_4 = \overline{x_1}x_2 \vee x_1\overline{x_2}$

$h_1(x_1, x_2, x_3) = max_1$

$h_2(x_1, x_2, x_3) = max_3$

Daca avem doua functii h vom avea doua forme simplificate:

$f'_1(x_1, x_2, x_3) = g(x_1, x_2, x_3) \vee h_1(x_1, x_2, x_3) = \overline{x_1}x_2 \vee x_1\overline{x_2} \vee \overline{x_1}x_3$

$f'_2(x_1, x_2, x_3) = g(x_1, x_2, x_3) \vee h_2(x_1, x_2, x_3) = \overline{x_1}x_2 \vee x_1\overline{x_2} \vee \overline{x_2}x_3$