

### Problema 9.3.2.5

Simplificați următoarele funcții booleene de 4 variabile, date prin formule canonice disjunctive, utilizând diagramele Veitch.

$$f_5(x_1, x_2, x_3, x_4) = x_1 x_2 x_3 x_4 \vee x_1 x_2 \bar{x}_3 x_4 \vee x_1 x_2 x_3 \bar{x}_4 \vee \bar{x}_1 x_2 \bar{x}_3 \bar{x}_4 \vee \bar{x}_1 x_2 x_3 \bar{x}_4 \vee x_1 \bar{x}_2 x_3 \bar{x}_4 \vee x_1 \bar{x}_2 \bar{x}_3 \bar{x}_4 \vee x_1 \bar{x}_2 x_3 x_4$$

1) Am notat mintermi:

$$m_{15} = x_1 x_2 x_3 x_4$$

$$m_{13} = x_1 x_2 \bar{x}_3 x_4$$

$$m_{14} = x_1 x_2 x_3 \bar{x}_4$$

$$m_4 = \bar{x}_1 x_2 \bar{x}_3 \bar{x}_4$$

$$m_6 = \bar{x}_1 x_2 x_3 \bar{x}_4$$

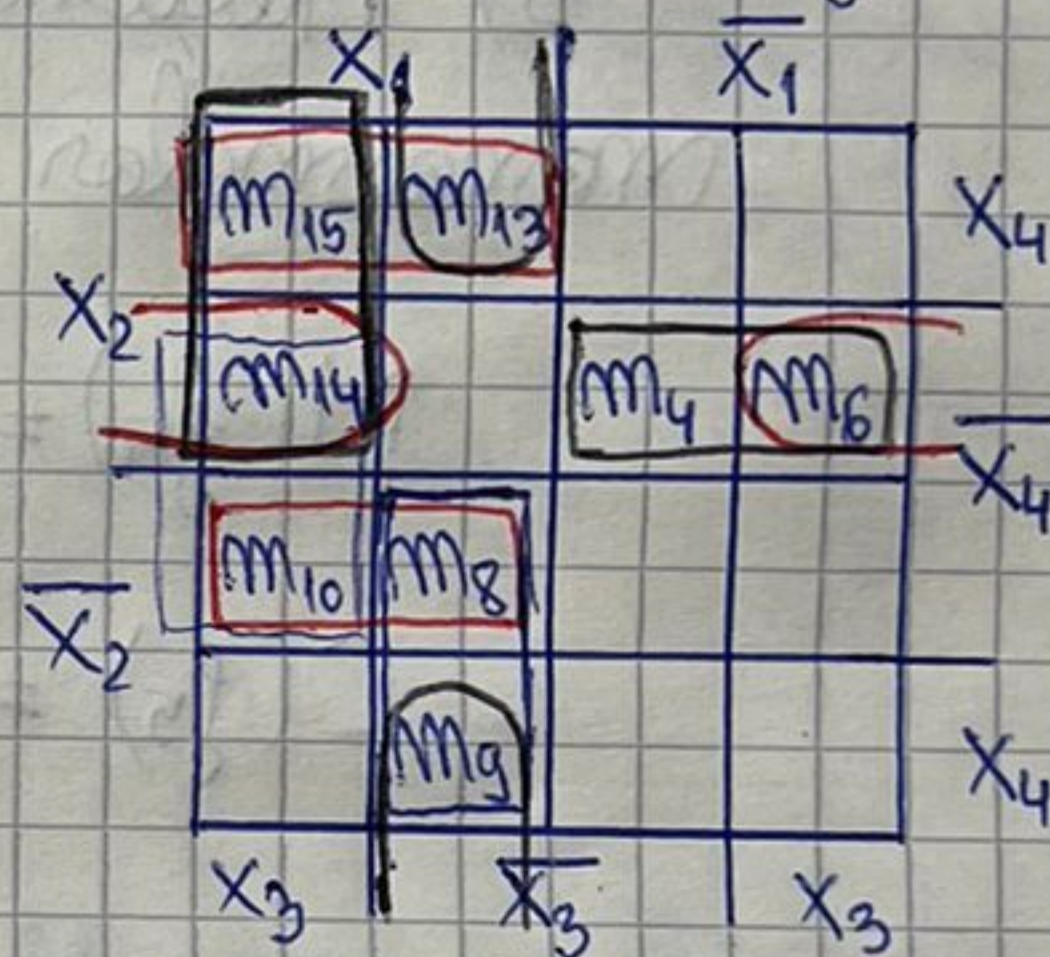
$$m_{10} = x_1 \bar{x}_2 x_3 \bar{x}_4$$

$$m_8 = x_1 \bar{x}_2 \bar{x}_3 \bar{x}_4$$

$$m_{10} = x_1 \bar{x}_2 x_3 \bar{x}_4$$

$$m_9 = x_1 \bar{x}_2 \bar{x}_3 x_4$$

2) Am completat diagrama Veitch



3) Determinăm mintermi adiacenți:

$$\max_1 = m_{15} \vee m_{13}$$

$$\max_8 = m_{14} \vee m_{10}$$

$$\max_2 = m_{15} \vee m_{14}$$

$$\max_3 = m_{14} \vee m_6$$

$$\max_4 = m_{13} \vee m_9$$

$$\max_5 = m_4 \vee m_6$$

$$\max_6 = m_{10} \vee m_8$$

$$\max_7 = m_8 \vee m_9$$



#### 4) Formulele mintermelor maxime

$$\max_1 = X_1 X_2 X_4$$

$$\max_2 = X_1 X_2 X_3$$

$$\max_3 = X_2 X_3 \bar{X}_4$$

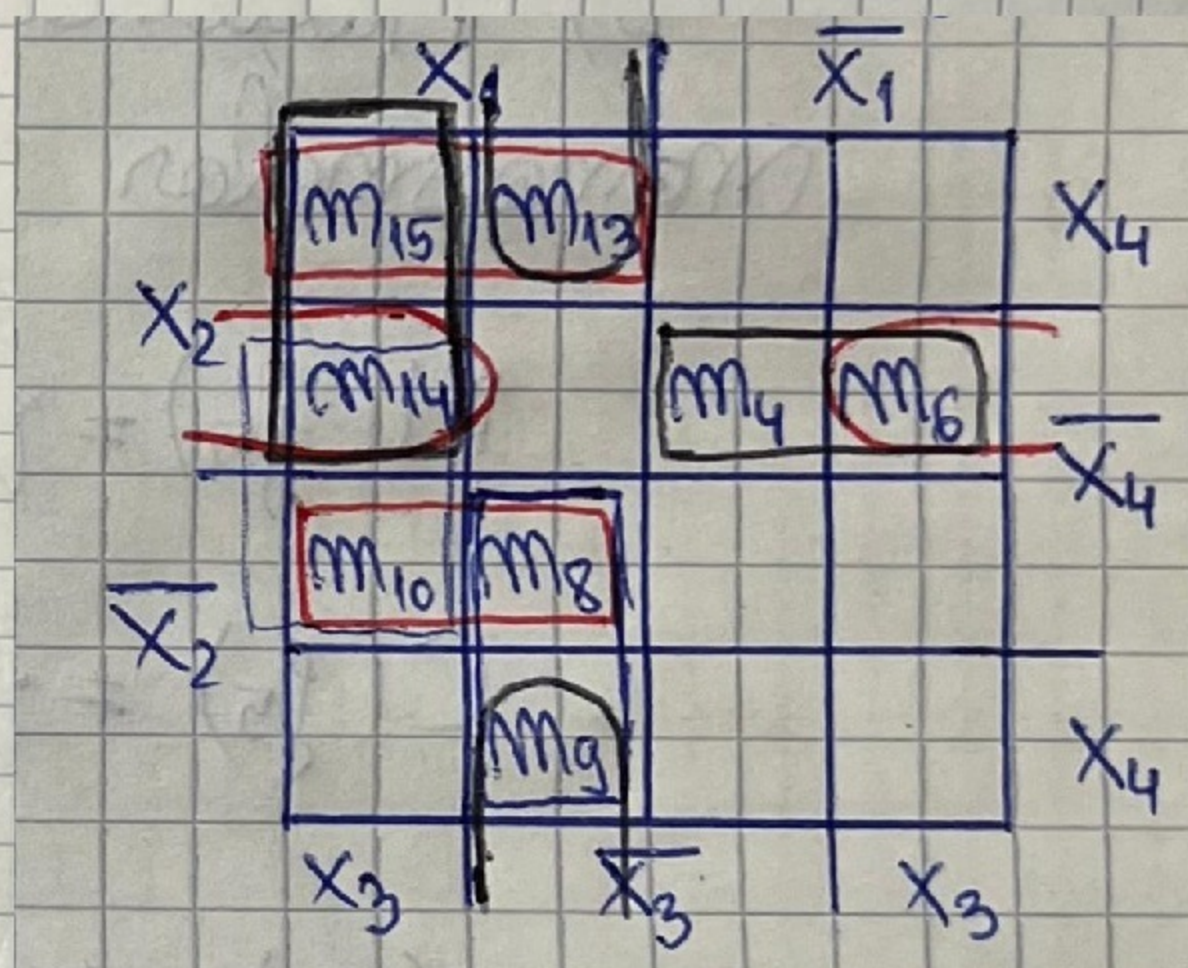
$$\max_4 = X_1 \bar{X}_3 X_4$$

$$\max_5 = \bar{X}_1 X_2 \bar{X}_4$$

$$\max_6 = X_1 \bar{X}_2 \bar{X}_4$$

$$\max_7 = X_1 \bar{X}_2 \bar{X}_3$$

$$\max_8 = X_1 X_3 \bar{X}_4$$



5) Multimea mintermelor maxime și multimea mintermelor minime.

$$M(f_5) = \{\max_1, \max_2, \max_3, \max_4, \max_5, \max_6, \max_7, \max_8\}$$

$$C(f_5) = \{\max_5\}$$

$$M(f_5) \neq C(f_5) \text{ și } C(f_5) \neq \emptyset \Rightarrow \text{cazul II}$$

$$g = \max_5 = \bar{X}_1 X_2 \bar{X}_4$$

$$\text{caz I: } f_1 = X_1 X_2 X_4 \vee X_1 X_3 \bar{X}_4 \vee X_1 \bar{X}_2 \bar{X}_3 \vee \bar{X}_1 X_2 \bar{X}_4$$

$$\text{caz II: } f_2 = X_1 X_2 X_3 \vee X_1 \bar{X}_3 X_4 \vee X_1 \bar{X}_2 \bar{X}_4 \vee \bar{X}_1 X_2 \bar{X}_4$$

$\Rightarrow$  2 soluții