

Лабораторна робота 4

«Форми подання та мінімізація логічних функцій»

Номер завдання	Зміст завдання
1	Визначити, в якій формі подана логічна функція ДНФ або КНФ? Якщо функція не є ДНФ (КНФ), її необхідно звести до такої.
2	Записати конституенту нуля та одиниці функції $f(x_1, x_2, x_3, x_4, x_5, x_6)$ на N -наборі відповідно до варіанта.
3	Перейти від ДНФ (КНФ) до ДДНФ (ДКНФ) за допомогою: <ul style="list-style-type: none">- таблиці істинності;- аналітичної форми;- карти Карно.
4	Записати в ДДНФ і ДКНФ булеву функцію $y = f(x_1, x_2, \dots, x_n)$, яка набуває відповідних значень P на заданих наборах.
5	Мінімізувати логічні функції наступними методами: <ul style="list-style-type: none">- аналітичним;- за допомогою карт Карно;

Варіанти завдань:

1

$$1. f(x, y, z, w) = \overline{x \bar{w} \vee x(\bar{w} \vee zy) \vee yw \vee xz \bar{w}}$$

$$2. f(a, b, d, f) = ab \vee \bar{a} \bar{b} \bar{d} \vee \bar{a} df \vee \bar{a} b \bar{f} d$$

$$3. f(x_1, x_2, x_3) = x_1 \bar{x}_3 \vee x_2 \bar{x}_3 \vee x_1 x_2 \bar{x}_3$$

$$4. f(a, b, c, d) = (a \vee \bar{b})(a \vee d)(a \vee d \vee b)(c \vee d)$$

$$5. f(x_1, x_2, x_3) = x_1 \bar{x}_2 \bar{x}_3 \vee x_1 x_3 \vee x_2 \bar{x}_3$$

$$6. f(x_1, x_2, x_3, x_4) = (\bar{x}_1 \vee x_2)(\bar{x}_2 \vee \bar{x}_3 \vee x_4)$$

2

$$1. f(a, b, c, e) = \overline{(a \bar{b} \bar{c} \vee b \bar{c} (a \vee e)) \vee \bar{b} c \bar{e}}$$

$$2. f(x_1, x_2, x_3) = (\bar{x}_1 \vee x_2)(x_1 \vee \bar{x}_2 \vee x_3)(\bar{x}_2 \vee \bar{x}_3)$$

$$3. f(a, b, c, d) = \overline{a \bar{b} \vee \bar{a} c \vee b(cd \vee \bar{a} b)}$$

$$4. f(x_1, x_2, x_3) = x_1 \bar{x}_2 \vee \bar{x}_1 x_2 \bar{x}_3 \vee x_2 x_3$$

$$5. f(a, b, c) = (a \vee b \vee \bar{c})(a \vee c)(b \vee \bar{c})$$

$$6. f(a, b, c) = \bar{a} b \vee \bar{a} bc \vee b \bar{c} \vee \bar{b} \bar{c}$$

3

$$1. f(x_1, x_2, x_3) = (x_1 \vee x_2)(\bar{x}_1 \vee \bar{x}_2)(x_1 \vee x_2 \vee x_3)$$

$$2. f(a, b, d, f) = \overline{ab \vee \bar{a} bd \vee \bar{a} df \vee ab \bar{f} d}$$

$$3. f(x_1, x_2, x_3) = x_1 \bar{x}_3 \vee x_2 \bar{x}_3 \vee x_1 x_2 \bar{x}_3$$

$$4. f(a, b, x, d) = (\bar{a} \vee b)(a \vee \bar{x} \vee d)(b \vee \bar{x} \vee \bar{d})$$

$$5. f(a, b, c, d) = ab(c \vee \bar{d}) \vee \bar{a} \vee a \bar{b} \bar{c} d \vee ab \bar{d}$$

$$6. f(a, b, c, d) = \overline{a \vee b \vee c \vee \bar{c} d \vee acd}$$

4

1. $f(x_1, x_2) = x_1 \vee x_1 x_2 \vee \overline{x_1} x_2$
2. $f(x_1, x_2, x_3) = (\overline{x_1} \vee x_2 \vee \overline{x_3})(x_1 \vee \overline{x_2})(x_2 \vee x_3)$
3. $f(a, b, c, d, x) = ab(c \vee x) \vee cdx(a \vee \overline{x}) \vee d \overline{x} \vee bcd$
4. $f(x_1, x_2, x_3) = x_1 \overline{x_2} \vee \overline{x_2} x_3 \vee x_1 \overline{x_2} x_3$
5. $f(a, b, c, d) = (\overline{a} \vee \overline{b})(a \vee b \vee c)(c \vee \overline{d})$
6. $f(a, b, c, x) = ab \overline{c} \vee \overline{a} bx \vee ac \vee c \overline{x}$

5

1. $f(a, b, c, d) = a \overline{b} \vee ac \overline{d} \vee b \overline{c} d \vee \overline{a} b \overline{c} d$
2. $f(a, b, c, d) = (a \vee \overline{b} \vee c)(a \vee \overline{c} \vee \overline{d})(\overline{c} \vee b \vee \overline{d})$
3. $f(a, b, c, d) = a \overline{b} c \vee \overline{a}(b \vee c \vee d) \vee abcd$
4. $f(a, b, c, d) = \overline{a} b \overline{c} \vee ab \overline{d} \vee ab(ac \vee d)$
5. $f(x_1, x_2, x_3) = \overline{x_1} x_2 \vee x_1 \overline{x_2} x_3 \vee x_2 x_3$
6. $f(a, b, c) = (\overline{a} \vee b)(\overline{a} \vee b \vee \overline{c})(b \vee \overline{c})$

6

1. $f(x_1, x_2) = x_1 \vee x_1 x_2 \vee \overline{x_1} \overline{x_2}$
2. $f(x_1, x_2, x_3) = (\overline{x_1} \vee x_2 \vee \overline{x_3})(x_1 \vee \overline{x_2})(x_2 \vee x_3)$
3. $f(a, b, c, d, x) = ab(c \vee x) \vee cdx((a \vee \overline{x}) \vee d \overline{x} \vee bcd)$
4. $f(a, b, c, d) = (\overline{a} \vee \overline{b})(a \vee b \vee c)(c \vee \overline{d})$
5. $f(x_1, x_2, x_3) = x_1 \overline{x_2} \vee x_1 x_3 \vee \overline{x_2} x_3 \vee x_1 \overline{x_2} x_3$
6. $f(a, b, c, x) = ab \overline{c} \vee \overline{a} bx \vee ac \vee c \overline{x}$

7

$$1. f(a,b,c) = (ab \vee c) \overline{a} \vee \overline{ab \vee c}$$

$$2. f(a,b,c) = (a \vee c)(\overline{a}b \vee \overline{c})(\overline{b} \vee c)$$

$$3. f(x,y,z) = xy \vee x \overline{z} \vee x \overline{y} z$$

$$4. f(a,b,c) = a(b \vee c)(a \vee bc)$$

$$5. f(a,d,c) = (\overline{a} \vee c)(\overline{a} \vee d \vee c)(d \vee \overline{c})$$

$$6. f(a,b,c) = a \overline{b} \vee \overline{a} b \overline{c} \vee bc$$

8

$$1. f(a,b,c) = \overline{a}(\overline{b} \vee \overline{c}) \vee a \overline{b} \vee a(b \vee \overline{c})$$

$$2. f(x,y,z) = (x \vee y \vee z)(x \vee \overline{z})(z \vee \overline{y})$$

$$3. f(a,b,c) = (a \vee \overline{b} \vee c)(a \vee \overline{c})(a \vee b \vee c)$$

$$4. f(a,b,c) = \overline{a}b \vee ab \overline{c} \vee b \overline{c}$$

$$5. f(a,b,c,d) = \overline{a}b \vee ab \overline{c} \vee b \overline{c} d$$

$$6. f(a,b,c,e) = \overline{a} \overline{b} c e \vee \overline{a} c \overline{e} \vee ab \overline{c} \vee a \overline{b}$$

9

$$1. f(a,b,c) = (ab \vee c) \overline{a} \vee ab(a \vee b \overline{c})$$

$$2. f(a,b,c) = (a \vee b)(\overline{a} \vee b \vee \overline{c})(\overline{b} \vee c)$$

$$3. f(x,y,z) = xy \vee x \overline{z} \vee x \overline{y} z$$

$$4. f(a,b,c) = a(b \vee c)(a \vee b \vee c)$$

$$5. f(a,d,c) = (\overline{a} \vee c)(\overline{a} \vee d \vee c)(d \vee \overline{c})$$

$$6. f(a,b,c) = a \overline{b} \vee \overline{a} b \overline{c} \vee bc$$

10

$$1. f(a,b) = \overline{\overline{a}b \vee b(a \vee \overline{b})}$$

$$2. f(a,d,e) = \overline{a\overline{d} \vee a(d \vee \overline{e}) \vee \overline{a}\overline{d}e}$$

$$3. f(a,b,c) = ab\overline{c} \vee \overline{a}b\overline{c} \vee bc$$

$$4. f(a,b,c,d) = (a \vee b)(\overline{a} \vee d)(\overline{a} \vee b \vee \overline{d})$$

$$5. f(x,y,z) = x\overline{y} \vee xy\overline{z} \vee \overline{xyz}$$

$$6. f(x,y,z) = (\overline{x} \vee y)(\overline{x} \vee \overline{y} \vee \overline{z})(x \vee \overline{y} \vee z)$$

11

$$1. f(x,y,z) = \overline{x\overline{z} \vee yx \vee \overline{xyz} \vee xz\overline{y}}$$

$$2. f(x,y,w) = x\overline{y} \vee xyw \vee \overline{xw}$$

$$3. f(x,y,z) = (\overline{x} \vee y)(x \vee \overline{y} \vee \overline{z})(\overline{y} \vee \overline{z})$$

$$4. f(a,b,c,f) = abc \vee abf \vee bcf \vee \overline{cf}$$

$$5. f(a,b,c,d) = ab\overline{c} \vee ad \vee \overline{c}d \vee a\overline{b}\overline{c}\overline{d}$$

$$6. f(a,b,f) = (\overline{b} \vee f)(\overline{a} \vee b \vee \overline{f})(\overline{a} \vee f)$$

12

$$1. f(a,b,c) = (ab \vee c)\overline{a} \vee ab(a \vee b\overline{c})$$

$$2. f(a,b,c) = (a \vee c)(a \vee \overline{b} \vee c)(\overline{b} \vee \overline{c})$$

$$3. f(x,y,z) = xy \vee x\overline{z} \vee x\overline{y}z$$

$$4. f(a,b,c) = ab\overline{c} \vee \overline{a}b\overline{c} \vee b\overline{a}b$$

$$5. f(a,d,c) = (\overline{a} \vee c)(\overline{a} \vee d \vee c)(d \vee \overline{c})$$

$$6. f(a,b,c) = a\overline{b} \vee \overline{a}b\overline{c} \vee bc$$

13

$$1. f(a,b,c,e) = a \bar{b} \bar{e} \vee \overline{b \bar{c} (a \vee e) \vee \bar{b} c \bar{e}}$$

$$2. f(a,b,c) = (\bar{a} \vee b)(a \vee \bar{b} \vee c)(\bar{b} \vee \bar{c})$$

$$3. f(a,b,c,d) = a \bar{b} \vee \bar{a} c \vee \overline{b(cd \vee \bar{a} d)}$$

$$4. f(a,d,e) = a \bar{d} \vee \bar{a} d \bar{e} \vee de$$

$$5. f(a,b,c) = (a \vee b \vee \bar{c})(a \vee c)(b \vee \bar{c})$$

$$6. f(a,b,c) = \bar{a} b \vee \bar{a} bc \vee b \bar{c} \vee \bar{b} \bar{c}$$

14

$$1. f(x,y,z) = (x \vee y \vee z)(x \vee z)(\bar{y} \vee \bar{z})$$

$$2. f(a,b,c,d) = a \bar{b} \vee ad \vee b \bar{c} d$$

$$3. f(a,b,c) = (\bar{a} \vee b)(a \vee \bar{b} \vee c)(\bar{b} \vee \bar{c})$$

$$4. f(a,b,x) = ab \bar{x} \vee x \bar{b} \vee \bar{a} bx$$

$$5. f(a,b,c,d) = \overline{a \vee b \vee \bar{c} \bar{d} \vee acd}$$

$$6. f(a,b,x) = ab \bar{x} \vee \bar{x} b \vee \bar{a} bx$$

15

$$1. f(a,b,c) = \overline{\bar{a}(\bar{b} \vee \bar{c}) \vee a \bar{b} \vee a(b \vee \bar{c})}$$

$$2. f(x,y,z) = (x \vee y \vee z)(x \vee \bar{z})(z \vee \bar{y})$$

$$3. f(x,y,z) = x \bar{y} \vee xy \bar{z} \vee yz$$

$$4. f(a,b,c) = (a \vee \bar{b} \vee c)(b \vee \bar{c})(a \vee b \vee c)$$

$$5. f(x,y,z) = \overline{\bar{y} \vee xyz \vee xz \bar{y}}$$

$$6. f(a,b,c,d) = \overline{a \vee b \vee c \vee \bar{c} da \vee cd}$$

16

$$1. f(x, y, z) = (x \vee y \vee z)(x \vee z)(\bar{z} \vee \bar{y})$$

$$2. f(a, b, c, d) = a\bar{b} \vee ad \vee b\bar{c}d$$

$$3. f(a, b, c) = (\bar{a} \vee \bar{b})(a \vee \bar{b} \vee c)(\bar{b} \vee \bar{c})$$

$$4. f(x, y, z) = \overline{xy\bar{z} \vee \bar{z}y \vee \bar{x}yz}$$

$$5. f(a, b, c, d) = a \vee b \vee c \vee \bar{c}d \vee \bar{c}\bar{d}$$

$$6. f(a, b, c, f) = \bar{a}(\bar{a} \vee \bar{b}) \vee b\bar{c}f \vee \bar{a}c\bar{f}$$

17

$$1. f(a, b, c, d) = \overline{a\bar{d} \vee a(\bar{d} \vee cb) \vee ad \vee ac\bar{d}}$$

$$2. f(a, b, c, f) = (a \vee \bar{b})(a \vee f)(a \vee b \vee f)(c \vee f)$$

$$3. f(x, y, z) = \bar{x}\bar{y}\bar{z} \vee xz \vee yz$$

$$4. f(a, b, c, d) = (\bar{a} \vee b)(\bar{b} \vee \bar{c} \vee d)(a \vee \bar{b} \vee c)$$

$$5. f(a, b, c, d) = \overline{a\bar{b} \vee \bar{a}\bar{d}\bar{c} \vee dbc \vee ab\bar{c}d}$$

$$6. f(a, b, c) = a\bar{b} \vee abc \vee \bar{a}\bar{b}(a \vee \bar{b}\bar{c})$$

18

$$1. f(a, b, c) = \overline{\bar{a}(\bar{b} \vee \bar{c}) \vee a\bar{b} \vee a(b \vee \bar{c})}$$

$$2. f(a, b, c) = (a \vee \bar{b} \vee c)(b \vee \bar{c})(a \vee b \vee c)$$

$$3. f(x, y, z) = x\bar{y} \vee xy\bar{z} \vee yz$$

$$4. f(x, y, z) = (x \vee y \vee z)(x \vee \bar{z})(z \vee \bar{y})$$

$$5. f(x, y, z) = \bar{x} \vee xy\bar{z} \vee x\bar{c}z$$

$$6. f(a, b, c, d) = \overline{\bar{a}\bar{b}\bar{c}\bar{d} \vee \bar{a}c\bar{d} \vee ab\bar{c} \vee a\bar{b}}$$

19

$$1. f(a, b, c) = a \bar{b} \vee \bar{a} b \bar{c} \vee bc$$

$$2. f(a, b, c) = (a \vee c)(\bar{a} b \vee \bar{c})(\bar{b} \vee c)$$

$$3. f(x, y, z) = xy \vee x \bar{z} \vee x \bar{y} z$$

$$4. f(a, b, c) = a(b \vee c)(a \vee bc)$$

$$5. f(a, b, c) = (\bar{a} \vee c)(\bar{a} \vee d \vee c)(d \vee \bar{c})$$

$$6. f(a, b, c) = (ab \vee c) \bar{a} \vee ab a \vee b \bar{c}$$

20

$$1. f(x, y, z, w) = xw \vee x(\bar{w} \vee zy) \vee yw \vee xz \bar{w}$$

$$2. f(x_1, x_2, x_3) = x_1 \bar{x}_2 \bar{x}_3 \vee \bar{x}_1 \bar{x}_3 \vee x_2 \bar{x}_3$$

$$3. f(x_1, x_2, x_3) = x_1 \bar{x}_2 \vee x_1 x_2 \bar{x}_3 \vee \bar{x}_1 \bar{x}_2 (x_1 \vee \bar{x}_2 \bar{x}_3)$$

$$4. f(a, b, c, d) = (a \vee \bar{b})(a \vee d)(a \vee b \vee d)(c \vee d)$$

$$5. f(a, b, c) = (ab \vee c) \bar{a} \vee ab a \vee b \bar{c}$$

$$6. f(x_1, x_2, x_3, x_4) = (\bar{x}_1 \vee \bar{x}_2)(\bar{x}_2 \vee \bar{x}_3 \vee x_4)(x_1 \vee \bar{x}_2 \vee x_3)$$

21

$$1. f(a, b, c) = \bar{a} b \vee \bar{a} bc \vee b \bar{c} \vee \bar{b} \bar{c}$$

$$2. f(x_1, x_2, x_3) = (\bar{x}_1 \vee x_2)(x_1 \vee \bar{x}_2 \vee x_3)(\bar{x}_2 \vee \bar{x}_3)$$

$$3. f(a, b, c, d) = a \bar{b} \vee \bar{a} c \vee \bar{b}(\bar{c} \vee \bar{b} \bar{c})$$

$$4. f(a, b, c, e) = a \bar{b} \bar{c} \vee \bar{b} c \bar{e} \bar{c} \vee \bar{a}$$

$$5. f(a, b, c) = (a \vee b \vee \bar{c})(a \vee c)(b \vee \bar{c})$$

$$6. f(x_1, x_2, x_3) = x_1 \bar{x}_2 \vee \bar{x}_1 \bar{x}_2 \bar{x}_3 \vee x_2 x_3$$

22

1. $f(x, y, z) = \overline{x \bar{z} \vee yx \vee \overline{xy} z \bar{y}}$
2. $f(a, b, f) = (\bar{b} \vee f)(\bar{a} \vee b \vee \bar{f})(\bar{a} \vee f)$
3. $f(x, y, w) = x \bar{y} \vee xyw \vee \overline{xw} \vee y \bar{w}$
4. $f(a, b, c, f) = ab \bar{c} \vee \bar{a} bf \vee bc \bar{f}$
5. $f(a, b, c, d) = ab \bar{c} \vee ad \vee \bar{c} d \vee a \bar{b} \bar{c} d \vee a$
6. $f(x, y, z) = (\bar{x} \vee y)(x \vee \bar{y} \vee \bar{z})(\bar{y} \vee \bar{z})$

23

1. $f(x_1, x_2) = x_1 \vee x_1 x_2 \vee \bar{x}_1 x_2$
2. $f(a, b, c, d) = (\bar{a} \vee \bar{b})(a \vee b \vee c)(c \vee \bar{d})$
3. $f(x_1, x_2, x_3) = (\bar{x}_1 \vee x_2 \vee \bar{x}_3)(x_1 \vee \bar{x}_2)(x_2 \vee x_3)$
4. $f(x_1, x_2, x_3) = x_1 \bar{x}_2 \vee x_1 x_3 \vee \bar{x}_2 x_3 \vee x_1 \bar{x}_2 x_3$
5. $f(a, b, c, d, x) = \overline{ab(c \vee x)} \vee \overline{cdx(a \vee \bar{x})} \vee d \bar{x} \vee bcd$
6. $f(a, b, c, x) = ab \bar{c} \vee \bar{a} bx \vee ac \vee c \bar{x}$

24

1. $f(a, b, c) = (a \vee b \vee \bar{c})(a \vee c)(b \vee \bar{c})$
2. $f(a, b, c) = (\bar{a} \vee b)(a \vee \bar{b} \vee c)(\bar{b} \vee \bar{c})$
3. $f(a, b, c, e) = \overline{a \bar{b} \bar{e} \vee b \bar{c} (a \vee e)} \vee \bar{b} c \bar{e}$
4. $f(a, b, c, d) = a \bar{b} \vee \bar{a} c \vee b(cd \vee \bar{a} d)$
5. $f(a, d, e) = a \bar{d} \vee \bar{a} d \bar{e} \vee de$
6. $f(a, b, c) = \bar{a} b \vee \bar{a} bc \vee b \bar{c} \vee \bar{b} \bar{c}$

25

$$1. f(x_1, x_2, x_3) = (\overline{x_1} \vee x_2 \vee \overline{x_3})(x_1 \vee \overline{x_2})(x_2 \vee x_3)$$

$$2. f(a, b, c, x) = ab\overline{c} \vee \overline{a}bx \vee ac \vee c\overline{x}$$

$$3. f(a, b, c, d, x) = ab(c \vee x) \vee cdx((a \vee \overline{x}) \vee d\overline{x} \vee bcd)$$

$$4. f(a, b, c, d) = (\overline{a} \vee \overline{b})(a \vee b \vee c)(c \vee \overline{d})$$

$$5. f(x_1, x_2) = x_1 \vee x_1x_2 \vee \overline{x_1}x_2$$

$$6. f(x_1, x_2, x_3) = x_1\overline{x_2} \vee x_1x_3 \vee \overline{x_2}x_3 \vee x_1\overline{x_2}x_3$$

26

$$1. f(x, y, z) = (x \vee y \vee z)(x \vee z)(\overline{y} \vee \overline{z})$$

$$2. f(a, b, c, d) = a \vee b \vee \overline{c}d \vee acd$$

$$3. f(a, b, c) = (\overline{a} \vee b)(a \vee \overline{b} \vee c)(\overline{b} \vee \overline{c})$$

$$4. f(a, b, x) = ab\overline{x} \vee x\overline{b} \vee \overline{a}bx$$

$$5. f(a, b, x) = ab\overline{x} \vee \overline{x}b \vee \overline{a}bx$$

$$6. f(a, b, c, d) = a\overline{b} \vee ad \vee b\overline{c}d$$

27

$$1. f(a, b, c, d) = ab\overline{c} \vee ab \vee \overline{c}d \vee a\overline{b}\overline{c}d$$

$$2. f(a, b, c, f) = ab\overline{c} \vee \overline{a}bf \vee bc\overline{f}$$

$$3. f(x, y, z) = (\overline{x} \vee y)(x \vee \overline{y} \vee \overline{z})(\overline{y} \vee \overline{z})$$

$$4. f(x, y, z) = x\overline{z} \vee yx \vee \overline{xy}z \vee xz\overline{y}$$

$$5. f(x, y, w) = x\overline{y} \vee xyw \vee \overline{xw} \vee y\overline{w}$$

$$6. f(a, b, f) = (\overline{b} \vee f)(\overline{a} \vee b \vee \overline{f})(\overline{a} \vee f)$$

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1. $f(x, y, w) = x \bar{y} \vee xyw \vee \overline{xw} \vee y \bar{w}$
2. $f(a, b, c, f) = ab \bar{c} \vee \bar{a} bf \vee bc \bar{f} \vee c \bar{f}$
3. $f(x, y, z) = xz \vee yx \vee \overline{xyz} \vee xz \bar{y}$
4. $f(a, b, f) = (\bar{b} \vee f)(\bar{a} \vee b \vee \bar{f})(\bar{a} \vee f)$
5. $f(a, b, c, d) = ab \bar{c} \vee ad \vee \bar{c} d \vee a \bar{b} \bar{c} d$
6. $f(x, y, z) = x \bar{z} \vee yx \vee \overline{xyz} \vee xz \bar{y}$

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1. $f(x, y, z, w) = xw \vee x(\bar{w} \vee zy) \vee yw \vee xz \bar{w}$
2. $f(x_1, x_2, x_3, x_4) = (\bar{x}_1 \vee \bar{x}_2)(\bar{x}_2 \vee \bar{x}_3 \vee x_4)(x_1 \vee \bar{x}_2 \vee x_3)$
3. $f(x_1, x_2, x_3) = x_1 \bar{x}_2 \vee x_1 x_2 \bar{x}_3 \vee \bar{x}_1 \bar{x}_2 (x_1 \vee \bar{x}_2 \bar{x}_3)$
4. $f(a, b, c, d) = (a \vee \bar{b})(a \vee d)(a \vee b \vee d)(c \vee d)$
5. $f(a, b, d, f) = a \bar{b} \vee \bar{a} \bar{f} d \vee fbd \vee ab \bar{d} f$
6. $f(x_1, x_2, x_3) = x_1 \bar{x}_2 \bar{x}_3 \vee x_1 x_3 \vee x_2 \bar{x}_3$

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1. $f(a, b, c) = \bar{a}(\bar{b} \vee \bar{c}) \vee a \bar{b} \vee a(b \vee \bar{c})$
2. $f(a, b, c, d) = a \vee b \vee c \vee \bar{c} da \vee cd$
3. $f(x, y, z) = \bar{y} \vee xy \bar{z} \vee x \bar{y} z$
4. $f(a, b, c) = (a \vee \bar{b} \vee c)(b \vee \bar{c})(a \vee b \vee c)$
5. $f(x, y, z) = (x \vee y \vee z)(x \vee \bar{z})(z \vee \bar{y})$
6. $f(x, y, z) = x \bar{y} \vee xy \bar{z} \vee yz$

Завдання II

Варіанти завдань

№ варіанта	<i>N</i>
1	24
2	48
3	53
4	57
5	38
6	18
7	22
8	40
9	36
10	34
11	39
12	59
13	55
14	35
15	16
16	29
17	11
18	63
19	41
20	27
21	50
22	33
23	15
24	49
25	45
26	47
27	46
28	60
29	21
30	19
31	17
32	42

№ варіанта	<i>N</i>
33	37
34	54
35	25
36	56
37	28
38	12
39	44
40	32
41	30
42	51
43	58
44	0
45	49
46	31
47	26
48	23
49	20
50	10
51	2
52	14
53	3
54	43
55	52
56	8
57	6
58	4
59	5
60	7
61	62
62	9
63	61
64	1

Завдання III

Варіанти завдань:

1.

$$y = \overline{x_1} \vee \overline{x_2 x_3} \vee \overline{x_1 x_3};$$

$$f = (\overline{x_1} \vee \overline{x_2} \vee \overline{x_3})(\overline{x_1} \vee \overline{x_3})(\overline{x_1} \vee \overline{x_2})(\overline{x_2} \vee \overline{x_3});$$

2.

$$y = \overline{x_1 x_2} \overline{x_3} \vee \overline{x_2 x_3} \vee \overline{x_1 x_3};$$

$$f = (\overline{x_1} \vee \overline{x_2})(\overline{x_1} \vee \overline{x_3})(\overline{x_2} \vee \overline{x_3})(\overline{x_1} \vee \overline{x_2} \vee \overline{x_3});$$

3.

$$y = \overline{x_1 x_2} \vee \overline{x_2 x_3} \vee \overline{x_2};$$

$$f = (\overline{x_1} \vee \overline{x_3})(\overline{x_1} \vee \overline{x_2} \vee \overline{x_3})(\overline{x_2} \vee \overline{x_3})(\overline{x_1} \vee \overline{x_2} \vee \overline{x_3});$$

4.

$$y = \overline{x_1 x_3} \vee \overline{x_2} \vee \overline{x_1 x_2 x_3};$$

$$f = (\overline{x_1} \vee \overline{x_2})(\overline{x_1} \vee \overline{x_2} \vee \overline{x_3})(\overline{x_1} \vee \overline{x_3})(\overline{x_2} \vee \overline{x_3});$$

5.

$$y = \overline{x_1} \vee \overline{x_2 x_3} \vee \overline{x_1 x_3};$$

$$f = (\overline{x_1} \vee \overline{x_2} \vee \overline{x_3})(\overline{x_1} \vee \overline{x_3})(\overline{x_1} \vee \overline{x_2})(\overline{x_2} \vee \overline{x_3});$$

6.

$$y = \overline{x_1 x_2 x_3} \vee \overline{x_2 x_3} \vee \overline{x_1 x_3};$$

$$f = (\overline{x_1} \vee \overline{x_2})(\overline{x_1} \vee \overline{x_3})(\overline{x_1} \vee \overline{x_2} \vee \overline{x_3})(\overline{x_1} \vee \overline{x_2});$$

7.

$$y = \overline{x_1} \vee \overline{x_2 x_3} \vee \overline{x_1 x_3};$$

$$f = (\overline{x_1} \vee \overline{x_2} \vee \overline{x_3})(\overline{x_1} \vee \overline{x_3})(\overline{x_1} \vee \overline{x_2})(\overline{x_2} \vee \overline{x_3});$$

8.

$$y = \overline{x_1 x_2} \vee \overline{x_2 x_3} \vee \overline{x_3};$$

$$f = (\overline{x_1} \vee \overline{x_3})(\overline{x_1} \vee \overline{x_2})(\overline{x_2} \vee \overline{x_3})$$

9.

$$y = \overline{x_1 x_2} \vee \overline{x_1 x_2 x_3} \vee \overline{x_3};$$

$$f = (\overline{x_1} \vee \overline{x_3})(\overline{x_1} \vee \overline{x_2 x_3})(\overline{x_1} \vee \overline{x_2})(\overline{x_2} \vee \overline{x_3})$$

10.

$$y = \overline{x_1 x_2} \vee \overline{x_2 x_3} \vee \overline{x_2};$$

$$f = (\overline{x_1} \vee \overline{x_3})(\overline{x_1} \vee \overline{x_2} \vee \overline{x_3})(\overline{x_1} \vee \overline{x_2})(\overline{x_2} \vee \overline{x_3})$$

11.

$$y = \overline{x_1 x_2 x_3} \vee \overline{x_2 x_3};$$

$$f = (\overline{x_1} \vee \overline{x_2})(\overline{x_1} \vee \overline{x_3})(\overline{x_1} \vee \overline{x_2} \vee \overline{x_3})$$

12.

$$y = \overline{x_1 x_2} \vee \overline{x_2 x_3} \vee \overline{x_3};$$

$$f = (\overline{x_1} \vee \overline{x_3})(\overline{x_1} \vee \overline{x_2})(\overline{x_2} \vee \overline{x_3})$$

13.
$$y = \overline{x_1 x_2 x_3} \vee \overline{x_2 x_3} \vee \overline{x_1 x_3}$$
$$f = (x_1 \vee x_2)(x_1 \vee x_2)(x_1 \vee \overline{x_2} \vee x_3)(\overline{x_1} \vee \overline{x_3})$$
14.
$$y = \overline{x_1 x_2} \vee \overline{x_2 x_3} \vee \overline{x_3}$$
$$f = (x_1 \vee x_3)(x_1 \vee x_2)(x_1 \vee x_2 \vee x_3)$$
15.
$$y = \overline{x_1 x_2 x_3} \vee \overline{x_2 x_3} \vee \overline{x_1 x_3}$$
$$f = (x_1 \vee x_2)(x_1 \vee x_3)(x_1 \vee x_2 \vee x_3)(x_1 \vee \overline{x_2})$$
16.
$$y = \overline{x_1 x_2} \vee \overline{x_3} \vee \overline{x_1 x_2 x_3}$$
$$f = (x_1 \vee x_2)(x_1 \vee x_3)(x_1 \vee \overline{x_2} \vee x_3)(x_1 \vee \overline{x_3})$$
17.
$$y = \overline{x_1 x_2 x_3} \vee \overline{x_2 x_3} \vee \overline{x_1 x_3}$$
$$f = (x_1 \vee x_2)(x_1 \vee x_3)(x_1 \vee x_2 \vee x_3)(x_1 \vee \overline{x_2})$$
18.
$$y = \overline{x_1} \vee \overline{x_2 x_3} \vee \overline{x_1 x_3}$$
$$f = (x_1 \vee x_2 \vee x_3)(x_1 \vee x_3)(x_1 \vee \overline{x_2})(\overline{x_2} \vee \overline{x_3})$$
19.
$$y = \overline{x_1 x_2 x_3} \vee \overline{x_1 x_2} \vee \overline{x_2 x_3}$$
$$f = (x_1 \vee x_2)(x_1 \vee x_3)(x_2 \vee x_3)(\overline{x_1} \vee \overline{x_2} \vee \overline{x_3})$$
20.
$$y = \overline{x_1 x_2} \vee \overline{x_1 x_2 x_3} \vee \overline{x_3}$$
$$f = (x_1 \vee x_3)(x_1 \vee x_2 \vee x_3)(x_1 \vee \overline{x_2})(\overline{x_2} \vee \overline{x_3})$$
21.
$$y = \overline{x_1 x_2} \vee \overline{x_2 x_3} \vee \overline{x_3}$$
$$f = (x_1 \vee x_3)(x_1 \vee x_2)(x_1 \vee x_2 \vee x_3)$$
22.
$$y = \overline{x_1 x_2 x_3} \vee \overline{x_2 x_3} \vee \overline{x_1 x_3}$$
$$f = (x_1 \vee x_2)(x_1 \vee x_3)(x_1 \vee x_2 \vee x_3)(x_1 \vee \overline{x_2})$$
23.
$$y = \overline{x_1 x_2 x_3} \vee \overline{x_2 x_3} \vee \overline{x_1 x_3}$$
$$f = (x_1 \vee x_2)(x_1 \vee x_2)(x_1 \vee \overline{x_2} \vee x_3)(\overline{x_1} \vee \overline{x_3})$$
24.
$$y = \overline{x_1} \vee \overline{x_2 x_3} \vee \overline{x_1 x_3}$$
$$f = (x_1 \vee x_2 \vee x_3)(x_1 \vee x_3)(x_1 \vee \overline{x_2})$$

25.

$$y = \overline{x_1 x_2} \vee \overline{x_3} \vee \overline{x_1 x_2 x_3}$$

$$f = (x_1 \vee x_2)(x_1 \vee x_3)(x_1 \vee x_2 \vee x_3)(x_1 \vee x_3)$$

26.

$$y = \overline{x_1 x_2 x_3} \vee \overline{x_2 x_3} \vee \overline{x_1 x_3}$$

$$f = (x_1 \vee x_2)(x_1 \vee x_3)(x_2 \vee x_3)(x_1 \vee x_2 \vee x_3)$$

27.

$$y = \overline{x_1 x_2 x_3} \vee \overline{x_2 x_3} \vee \overline{x_1 x_3}$$

$$f = (x_1 \vee x_2)(x_1 \vee x_2)(x_1 \vee x_2 \vee x_3)(x_1 \vee x_3)$$

28.

$$y = \overline{x_1 x_2 x_3} \vee \overline{x_2 x_3} \vee \overline{x_1 x_3}$$

$$f = (x_1 \vee x_2)(x_1 \vee x_3)(x_1 \vee x_2 \vee x_3)(x_1 \vee x_2)$$

29.

$$y = \overline{x_1 x_2 x_3} \vee \overline{x_2 x_3} \vee \overline{x_1 x_3}$$

$$f = (x_1 \vee x_2)(x_1 \vee x_3)(x_2 \vee x_3)(x_1 \vee x_2 \vee x_3)$$

30.

$$y = \overline{x_1 x_2} \vee \overline{x_1 x_2 x_3} \vee \overline{x_3}$$

$$f = (x_1 \vee x_3)(x_1 \vee x_2 \vee x_3)(x_1 \vee x_2)(x_2 \vee x_3)$$

Завдання IV

Варіанти завдань

№ варіанта	$y = f(x_1, x_2, \dots, x_n)$	P	Набори з номерами
1	$y = f(x, y, z)$	1	0,2,3,5,6
2	$y = f(a, b, c, d)$	1	3,6,8,14,12
3	$y = f(a, b, c, d, f)$	1	7,18,20,24,30
4	$y = f(x, y, z, w)$	1	2,4,6,9,13
5	$y = f(a, b, c, d)$	1	4,6,8,9,14
6	$y = f(x, y, z, d)$	1	1,3,6,8,14
7	$y = f(a, b, c, d, f)$	1	6,8,15,19,24
8	$y = f(a, b, c, e)$	1	2,6,10,13
9	$y = f(a, c, d, f)$	1	0,4,7,8,9
10	$y = f(a, b, c, d, f)$	1	0,2,5,8,11

11	$y = f(a,b,c,d)$	1	0,4,5,6
12	$y = f(a,b,c,d,f)$	1	6,7,8,12,14
13	$y = f(a,b,c,d,f)$	1	0,4,8,9,14
14	$y = f(a,b,c,d,f)$	1	0,1,5,8,12
15	$y = f(a,b,c,d,f)$	1	0,4,7,9,14
16	$y = f(x,y,z,v)$	0	0,4,7,9,10,14
17	$y = f(a,b,c,d,e)$	1	0,1,3,11,14
18	$y = f(x,y,z,w,v)$	1	5,8,12,17,24
19	$y = f(a,b,c,e)$	1	0,1,3,5,7,14
20	$y = f(a,b,c,d)$	0	0,1,7,12,13
21	$y = f(x,y,z,w)$	0	2,3,10,12
22	$y = f(a,b,c,d,e)$	0	2,4,6,26,27
23	$y = f(a,b,c,d)$	0	2,3,8,9,13
24	$y = f(x,y,z)$	0	0,1,4,5,6
25	$y = f(a,b,c,d,e)$	0	2,3,8,17,26
26	$y = f(a,b,c,d,e)$	0	7,18,20,24,30
27	$y = f(a,b,c,d)$	1	1,3,6,13
28	$y = f(a,b,c,e,f)$	1	0,3,11,14
29	$y = f(a,b,c,d,e)$	1	0,2,14,20,29
30	$y = f(x,y,z)$	1	0,1,3,5,7

Завдання V

Приклади розв'язання завдання V.

1. Приклад мінімізації логічної функції за допомогою діаграми Вейча.

Задана функція $F(x_1, x_2, x_3, x_4) = V1(1, 2, 4, 6, 8, 9, 11, 13, 15)$, нижче наведено отримання мінімальної функції

3. Будуємо таблицю покриття

	$\bar{x}_1\bar{x}_2x_3\bar{x}_4$	$\bar{x}_1x_2\bar{x}_3\bar{x}_4$	$\bar{x}_1x_2\bar{x}_3x_4$	$\bar{x}_1x_2x_3\bar{x}_4$	$x_1\bar{x}_2\bar{x}_3x_4$	$x_1\bar{x}_2x_3\bar{x}_4$	$x_1x_2\bar{x}_3x_4$	$x_1x_2x_3x_4$
$\bar{x}_1x_2\bar{x}_3$		✓	✓					
x_2x_4			✓	✓			✓	✓
x_1x_4					✓	✓	✓	✓

$$f_{\min}(x_1, x_2, x_3, x_4) = x_1x_4 + x_2x_4 + \bar{x}_1x_2\bar{x}_3 + \bar{x}_1\bar{x}_2x_3\bar{x}_4.$$

Варіанти завдань

$f(x_1, x_2, x_3, x_4) =$	
1. $V_1(0,2,3,5,7,8,10,13)$	22. $V_1(0,1,4,7,11,12,15)$
2. $V_1(0,1,2,3,4,9,10,11,12)$	23. $V_1(1,2, 6,7,9,10,11,13)$
3. $V_1(0,1,2,4,6,9,8,11)$	24. $V_1(2,3,5,7,9,11,12,14)$
4. $V_1(0,1,3,5,7,9,10,14)$	25. $V_1(0,1,2,4,5,8,11,12,15)$
5. $V_1(1,2,5,6,8,9,11,13,14)$	26. $V_1(1,2,4,6,10,11,15)$
6. $V_1(1,3,4,7,9,12,13)$	27. $V_1(2,4,5,7,9,11,13,14)$
7. $V_1(0,1,2,5,7,8,11,14,15)$	28. $V_1(1,6,7,9,10,11,14,15)$
8. $V_1(1,2,3,5,8,9,10,11)$	29. $V_1(2,3,4,10,11,12,14)$
9. $V_1(0,1,3,4,6,8,10,12)$	30. $V_1(0,2,4,5,6,8,12,14)$
10. $V_1(1,4,5,9,11,12,13,14)$	31. $V_1(1,3,6,8,11,12,13,15)$
11. $V_1(1,3,5,9,11,13,14)$	32. $V_1(1,5,6,7,9,10,13,14)$
12. $V_1(0,1,2,8,9,10,11,14)$	33. $V_1(2,4,6,7,11,12,13,14)$
13. $V_1(0,1,2,5,6,8,10,15)$	34. $V_1(0,3,7, 9,10,11,12,14)$
14. $V_1(0,1,4,7,8,11,12,14)$	35. $V_1(0,2,6,7,10,12,13)$
15. $V_1(1,4,6,7,10,11,13,15)$	36. $V_1(1,4,6,7,9,11,13,14,15)$
16. $V_1(0,2,4,5,6,9,10,12)$	37. $V_1(0,3,5,7,9,10,11,14)$
17. $V_1(2,4,6,8,11,12,13,15)$	38. $V_1(0,1,4,5,7,12,13,15)$
18. $V_1(1,4,5,10,11,12,13,15)$	39. $V_1(0,2,4,5,7,11,12,13,15)$
19. $V_1(0,2,3,6,8,10,11,14)$	40. $V_1(0,1,4,5,6,8,10,11,13)$
20. $V_1(0,1,2,5,6,9,11,13)$	41. $V_1(1,2,3,4,5,7,8,9,13)$
21. $V_1(1,2,5,7,10,13,15)$	42. $V_1(0,1,2,4,5,7,8,9,11)$
44. $V_1(3,4,7,9,10,12,14,15)$	43. $V_1(0,3,4,7,9,11,12,14,15)$
	45. $V_1(0,1,2,4,6,8,9,11,12)$