Составим таблицу истинности для указанной в задании ФАЛ.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *n* | *x*1 | *x*2 | *x*3 | *x*4 | *f(x*1, *x*2, *x*3, *x*4*)* |
| 0 | 0 | 0 | 0 | 0 | 1 |
| 1 | 0 | 0 | 0 | 1 | 1 |
| 2 | 0 | 0 | 1 | 0 | 0 |
| 3 | 0 | 0 | 1 | 1 | 1 |
| 4 | 0 | 1 | 0 | 0 | 1 |
| 5 | 0 | 1 | 0 | 1 | 1 |
| 6 | 0 | 1 | 1 | 0 | 0 |
| 7 | 0 | 1 | 1 | 1 | 1 |
| 8 | 1 | 0 | 0 | 0 | 1 |
| 9 | 1 | 0 | 0 | 1 | 1 |
| 10 | 1 | 0 | 1 | 0 | 0 |
| 11 | 1 | 0 | 1 | 1 | 1 |
| 12 | 1 | 1 | 0 | 0 | 1 |
| 13 | 1 | 1 | 0 | 1 | 1 |
| 14 | 1 | 1 | 1 | 0 | 0 |
| 15 | 1 | 1 | 1 | 1 | 1 |

Выведем ДСНФ для заданной функции по формуле



$$\overbar{x\_{1}} \overbar{x\_{2}} \overbar{x\_{3}} \overbar{x\_{4}} ∨\overbar{x\_{1}} \overbar{x\_{2}} \overbar{x\_{3}} x\_{4}∨\overbar{x\_{1}} \overbar{x\_{2}} x\_{3} x\_{4}∨\overbar{x\_{1}} x\_{2} \overbar{x\_{3}} x\_{4}∨\overbar{x\_{1}} x\_{2} \overbar{x\_{3}} x\_{4}∨\overbar{x\_{1}} x\_{2} x\_{3} x\_{4}∨$$

$$∨x\_{1}\overbar{x\_{2}} \overbar{x\_{3}} \overbar{x\_{4}}∨x\_{1}\overbar{x\_{2}} \overbar{x\_{3}} x\_{4}∨x\_{1}\overbar{x\_{2}} x\_{3} x\_{4}∨x\_{1}x\_{2} \overbar{x\_{3}} \overbar{x\_{4}}∨x\_{1}x\_{2} \overbar{x\_{3}} x\_{4}∨x\_{1}x\_{2}x\_{3} x\_{4}$$

Выведем ПСНФ, заменив в ДСНФ знаки дизъюнкции на знаки суммы по модулю 2.

$$\overbar{x\_{1}} \overbar{x\_{2}} \overbar{x\_{3}} \overbar{x\_{4}} ⨁\overbar{x\_{1}} \overbar{x\_{2}} \overbar{x\_{3}} x\_{4}⨁\overbar{x\_{1}} \overbar{x\_{2}} x\_{3} x\_{4}⨁\overbar{x\_{1}} x\_{2} \overbar{x\_{3}} x\_{4}⨁\overbar{x\_{1}} x\_{2} \overbar{x\_{3}} x\_{4}⨁\overbar{x\_{1}} x\_{2} x\_{3} x\_{4}⨁$$

$$⨁x\_{1}\overbar{x\_{2}} \overbar{x\_{3}} \overbar{x\_{4}}⨁x\_{1}\overbar{x\_{2}} \overbar{x\_{3}} x\_{4}⨁x\_{1}\overbar{x\_{2}} x\_{3} x\_{4}⨁x\_{1}x\_{2} \overbar{x\_{3}} \overbar{x\_{4}}⨁x\_{1}x\_{2} \overbar{x\_{3}} x\_{4}⨁x\_{1}x\_{2}x\_{3} x\_{4}$$

Выведем КСНФ для заданной функции по формуле



$$\left(x\_{1}⋁x\_{2}⋁\overbar{x\_{3}}⋁x\_{4}\right)\left(x\_{1}⋁\overbar{x\_{2}}⋁\overbar{x\_{3}}⋁x\_{4}\right)\left(\overbar{x\_{1}}⋁x\_{2}⋁\overbar{x\_{3}}⋁x\_{4}\right)\left(\overbar{x\_{1}}⋁\overbar{x\_{2}}⋁\overbar{x\_{3}}⋁x\_{4}\right)$$

Выведем ЭСНФ, заменив в СКНФ конъюнкции эквиваленциями.

$$\left(x\_{1}⋁x\_{2}⋁\overbar{x\_{3}}⋁x\_{4}\right)≈\left(x\_{1}⋁\overbar{x\_{2}}⋁\overbar{x\_{3}}⋁x\_{4}\right)≈\left(\overbar{x\_{1}}⋁x\_{2}⋁\overbar{x\_{3}}⋁x\_{4}\right)≈\left(\overbar{x\_{1}}⋁\overbar{x\_{2}}⋁\overbar{x\_{3}}⋁x\_{4}\right)$$

Выведем ИСНФ – аналог ДСНФ по формуле



($\overbar{\overbar{\overbar{x\_{1}}\rightarrow x\_{2}}\rightarrow x\_{3}\rightarrow x\_{4}}$)$∨\left(\overbar{\overbar{\overbar{x\_{1}}\rightarrow x\_{2}}\rightarrow x\_{3}\rightarrow \overbar{x\_{4}}}\right)∨\left(\overbar{\overbar{\overbar{x\_{1}}\rightarrow x\_{2}}\rightarrow \overbar{x\_{3}}\rightarrow \overbar{x\_{4}}}\right)∨$

$$∨\left(\overbar{\overbar{\overbar{x\_{1}}\rightarrow \overbar{x\_{2}}}\rightarrow x\_{3}\rightarrow \overbar{x\_{4}}}\right)∨\left(\overbar{\overbar{\overbar{x\_{1}}\rightarrow \overbar{x\_{2}}}\rightarrow x\_{3}\rightarrow \overbar{x\_{4}}}\right)∨\left(\overbar{\overbar{\overbar{x\_{1}}\rightarrow \overbar{x\_{2}}}\rightarrow \overbar{x\_{3}}\rightarrow \overbar{x\_{4}}}\right)∨$$

$$∨\left(\overbar{\overbar{x\_{1}\rightarrow x\_{2}}\rightarrow x\_{3}\rightarrow x\_{4}}\right)∨\left(\overbar{\overbar{x\_{1}\rightarrow x\_{2}}\rightarrow x\_{3}\rightarrow \overbar{x\_{4}}}\right)∨\left(\overbar{\overbar{x\_{1}\rightarrow x\_{2}}\rightarrow \overbar{x\_{3}}\rightarrow \overbar{x\_{4}}}\right)∨$$

$$∨\left(\overbar{\overbar{x\_{1}\rightarrow \overbar{x\_{2}}}\rightarrow x\_{3}\rightarrow x\_{4}}\right)∨\left(\overbar{\overbar{x\_{1}\rightarrow \overbar{x\_{2}}}\rightarrow x\_{3}\rightarrow \overbar{x\_{4}}}\right)∨\left(\overbar{\overbar{x\_{1}\rightarrow \overbar{x\_{2}}}\rightarrow \overbar{x\_{3}}\rightarrow \overbar{x\_{4}}}\right)$$

Выведем ИСНФ – аналог КСНФ по формуле



$$\left(\overbar{\overbar{\overbar{x\_{1}}\rightarrow x\_{2}}\rightarrow \overbar{x\_{3}}}\rightarrow x\_{4}\right)\left(\overbar{\overbar{\overbar{x\_{1}}\rightarrow \overbar{x\_{2}}}\rightarrow \overbar{x\_{3}}}\rightarrow x\_{4}\right)\left(\overbar{\overbar{x\_{1}\rightarrow x\_{2}}\rightarrow \overbar{x\_{3}}}\rightarrow x\_{4}\right)\left(\overbar{\overbar{x\_{1}\rightarrow \overbar{x\_{2}}}\rightarrow \overbar{x\_{3}}}\rightarrow x\_{4}\right)$$