Понятие нормальной дизъюнктивной формы (ДНФ)

Простая конъюнкция – конъюнкция когда каждая переменная встречается не более 1 раза (пример !A & B & C)

* Полная конъюнкция – когда все переменные встречаются
* Монотонная – когда нет отрицаний

ДНФ – нормальная форма, в которой логическая функция имеет вид дизъюнкции нескольких простых конъюнктов ( пример f(A,B,C) = (A & B) || (B & C) )

СДНФ – ДНФ, удовлетворяющая условиям:

* В ней нет одинаковых простых конъюнкций
* Каждая простая конъюнкция полная

Пример f(A,B,C) = (A & !B & C) || (A & B & !C)

A ⇔ B || (!B & C) = f(A,B,C)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| A | B | C | !B | !B & C | A ⬄ B | A ⬄ B || (!B & C) |  |
| **1** | **1** | **1** | 0 | 0 | 1 | **1** | **A & B & C** |
| **1** | **1** | **0** | 0 | 0 | 1 | **1** | **A & B & !C** |
| **1** | **0** | **1** | 1 | 1 | 0 | **1** | **A & !B & C** |
| 1 | 0 | 0 | 1 | 0 | 0 | 0 |  |
| 0 | 1 | 1 | 0 | 0 | 0 | 0 |  |
| 0 | 1 | 0 | 0 | 0 | 0 | 0 |  |
| **0** | **0** | **1** | 1 | 1 | 1 | **1** | **!A & !B & C** |
| **0** | **0** | **0** | 0 | 0 | 1 | **1** | **!A & !B & !C** |

(**A & B & C**) || (**A & B & !C) || (A & !B & C) || (!A & !B & C) || (!A & !B & !C)**

КНФ наоборот

№1

(x ⇔ y) ⇒ !(x || z) & y

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| x | y | Z | x ⇔ y | (x || z) | !(x || z) | !(x || z) & y | (x ⇔ y) ⇒ !(x || z) & y |
| 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 |
| 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 |
| 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 |
| 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 |
| 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 |
| 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 |
| 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 |

№2

X & !Y || X & Z || !X & Y & !Z

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| x | y | z | !x | !y | !z | X & !Y | X & Z | !X & Y | !X & Y & !Z |  |
| 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 |
| 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 |
| 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 |
| 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |

№3

!x & y || !y & z || x & !y & z

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| x | y | z | !x | !y | !x & y | !y & z | x & !y | x & !y & z |  |
| 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 |
| 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 |
| 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 |
| 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |

№4