Дискретная математика. Функции.

Артем Шутов

Тавтология

A	A or not A
0	1
1	1

A	B	A => (B => A)
0	0	1
0	1	1
1	0	1
1	1	1

A	B	(A and B) => A
0	0	1
0	1	1
1	0	1
1	1	1

A	B	(A and B) => B
0	0	1
0	1	1
1	0	1
1	1	1

A	B	((not B) => (not A)) => (((not B) => A) => B)
0	0	1
0	1	1
1	0	1
1	1	1

A	B	C	(A => B) => ((B => C) => (A => C))
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	1

A	A => A
0	1
1	1

A	B	A => (B => (A and B))
0	0	1
0	1	1
1	0	1
1	1	1

A	B	A => (A or B)
0	0	1
0	1	1
1	0	1
1	1	1

A	B	B => (A or B)
0	0	1
0	1	1
1	0	1
1	1	1

A	B	((A => B) => A) => A
0	0	1
0	1	1
1	0	1
1	1	1

A	B	C	(A => (B => C)) => ((A => B) => (A => C))
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	1

Двойственные

f_0	not 0
0	1
1	1

x	y	not (not x and not y)
0	0	0
0	1	1
1	0	1
1	1	1

x	y	not (not (not x => not y))
0	0	1
0	1	0
1	0	1
1	1	1

x	not (not x)
0	0
1	1

x	y	not (not (not y => not x))
0	0	1
0	1	1
1	0	0
1	1	1

y	not (not y)
0	0
1	1

x	y	not ((not x) xor (not y))
0	0	1
0	1	0
1	0	0
1	1	1

x	y	not ((not x) or (not y))
0	0	0
0	1	0
1	0	0
1	1	1

x	y	not ((not x) nor (not y))
0	0	1
0	1	1
1	0	1
1	1	0

x	y	not ((not x) = (not y))
0	0	0
0	1	1
1	0	1
1	1	0

y	not (not (not y))
0	1
1	0

x	y	not ((not y) => (not x))
0	0	0
0	1	0
1	0	1
1	1	0

x	not (not (not x))
0	1
1	0

x	y	not ((not x) => (not y))
0	0	0
0	1	1
1	0	0
1	1	0

x	y	not ((not x) nand (not y))
0	0	1
0	1	0
1	0	0
1	1	0

f_15	not 1
0	0
1	0

Практика

1)

x	y	(x = y) xor x	x = (y xor x)
0	0	1	1
0	1	0	0
1	0	1	1
1	1	0	0

2)

x	y	(y = x) xor y	y = (x xor y)
0	0	1	1
0	1	1	1
1	0	0	0
1	1	0	0

3)

x	y	z	(x = y) xor z	x = (y xor z)
0	0	0	1	1
0	0	1	0	0
0	1	0	0	0
0	1	1	1	1
1	0	0	0	0
1	0	1	1	1
1	1	0	1	1
1	1	1	0	0

4)

x	y	(x nand y) nor x	x nand (y nor x)
0	0	0	1
0	1	0	1
1	0	0	1
1	1	0	1

5)

x	y	(y nand x) nor y	y nand (x nor y)
0	0	0	1
0	1	0	1
1	0	0	1
1	1	0	1

6)

x	y	z	(x nand y) nor z	x nand (y nor z)
0	0	0	0	1
0	0	1	0	1
0	1	0	0	1
0	1	1	0	1
1	0	0	0	0
1	0	1	0	1
1	1	0	1	1
1	1	1	0	1

7)

x	y	(x nand y) and x	x nand (y and x)
0	0	0	1
0	1	0	1
1	0	1	1
1	1	0	0

8)

x	y	(y nand x) and y	y nand (x and y)
0	0	0	1
0	1	1	1
1	0	0	1
1	1	0	0

9)

x	y	z	(x nand y) and z	x nand (y and z)
0	0	0	0	1
0	0	1	1	1
0	1	0	0	1
0	1	1	1	1
1	0	0	0	1
1	0	1	1	1
1	1	0	0	1
1	1	1	0	0

10)

x	y	(x nor y) and x	x nor (y and x)
0	0	0	1
0	1	0	1
1	0	0	0
1	1	0	0

11)

x	y	(y nor x) and y	y nor (x and y)
0	0	0	1
0	1	0	0
1	0	0	1
1	1	0	0

12)

x	y	z	(x nor y) and z	x nor (y and z)
0	0	0	0	1
0	0	1	1	1
0	1	0	0	1
0	1	1	0	0
1	0	0	0	0
1	0	1	0	0
1	1	0	0	0
1	1	1	0	0