2-2

1. А) 4

Б) 5

В)1,2,4,7

Г)3,5,6

1. А) f(A,B,C,D) = (A+B+C)D;

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| А | B | C | D | A+B+C | (A+B+C)D | ЭК | ЭД |
| 0 | 0 | 0 | 0 | 0 | 0 | - | A+B+C+D |
| 0 | 0 | 0 | 1 | 0 | 0 | - | A+B+C+!D |
| 0 | 0 | 1 | 0 | 1 | 0 | - | A+B+!C+D |
| 0 | 0 | 1 | 1 | 1 | 1 | !A!BCD | - |
| 0 | 1 | 0 | 0 | 1 | 0 | - | A+!B+C+D |
| 0 | 1 | 0 | 1 | 1 | 1 | !AB!CD | - |
| 0 | 1 | 1 | 0 | 1 | 0 | - | A+!B+!C+D |
| 0 | 1 | 1 | 1 | 1 | 1 | !ABCD | - |
| 1 | 0 | 0 | 0 | 1 | 0 | - | !A+B+C+D |
| 1 | 0 | 0 | 1 | 1 | 1 | A!B!CD | - |
| 1 | 0 | 1 | 0 | 1 | 0 | - | !A+B+!C+D |
| 1 | 0 | 1 | 1 | 1 | 1 | A!BCD | - |
| 1 | 1 | 0 | 0 | 1 | 0 | - | !A+!B+C+D |
| 1 | 1 | 0 | 1 | 1 | 1 | AB!CD | - |
| 1 | 1 | 1 | 0 | 1 | 0 | - | !A+!B+!C+D |
| 1 | 1 | 1 | 1 | 1 | 1 | ABCD | - |

СДНФ: !A!BCD + !AB!CD + !ABCD + A!B!CD + A!BCD + AB!CD + ABCD

СКНФ: (A+B+C+D)(A+B+C+!D)(A+B+!C+D)(A+!B+C+D)(A+!B+!C+D)(!A+B+C+D)(!A+B+!C+D)(!A+!B+C+D)( !A+!B+!C+D)

Б) f(A,B,C,D) = A +BCD +!B!C;

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| А | B | C | D | !B | !C | BCD | !B!C | A +BCD +!B!C | ЭК | ЭД |
| 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | !A!B!C!D | - |
| 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | !A!B!CD | - |
| 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | - | A+B+!C+D |
| 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | - | A+B+!C+!D |
| 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | - | A+!B+C+D |
| 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | - | A+!B+C+!D |
| 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | - | A+!B+!C+D |
| 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | !ABCD | - |
| 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | A!B!C!D | - |
| 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | A!B!CD | - |
| 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | A!BC!D | - |
| 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | A!BCD | - |
| 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | AB!C!D | - |
| 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | AB!CD | - |
| 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | ABC!D | - |
| 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | ABCD | - |

СДНФ: !A!B!C!D + !A!B!CD + !ABCD + A!B!C!D + A!B!CD + A!BC!D + A!BCD + AB!C!D

СКНФ: (A+B+!C+D)(A+B+!C+!D)(A+!B+C+D)(A+!B+C+!D)(A+!B+!C+D)

В)f(A,B,C,D) = AB(C+D);

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| А | B | C | D | С + D | AB | AB(C+D) | ЭК | ЭД |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | - | A+B+C+D |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | - | A+B+C+!D |
| 0 | 0 | 1 | 0 | 1 | 0 | 0 | - | A+B+!C+D |
| 0 | 0 | 1 | 1 | 1 | 0 | 0 | - | A+B+!C+!D |
| 0 | 1 | 0 | 0 | 0 | 0 | 0 | - | A+!B+C+D |
| 0 | 1 | 0 | 1 | 1 | 0 | 0 | - | A+!B+C+D |
| 0 | 1 | 1 | 0 | 1 | 0 | 0 | - | A+!B+!C+D |
| 0 | 1 | 1 | 1 | 1 | 0 | 0 | - | A+!B+!C+!D |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | - | !A+B+C+D |
| 1 | 0 | 0 | 1 | 1 | 0 | 0 | - | !A+B+C+!D |
| 1 | 0 | 1 | 0 | 1 | 0 | 0 | - | !A+B+!C+D |
| 1 | 0 | 1 | 1 | 1 | 0 | 0 | - | !A+B+!C+!D |
| 1 | 1 | 0 | 0 | 0 | 1 | 0 | - | !A+!B+C+D |
| 1 | 1 | 0 | 1 | 1 | 1 | 1 | AB!CD | - |
| 1 | 1 | 1 | 0 | 1 | 1 | 1 | ABC!D | - |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | ABCD | - |

СДНФ: AB!CD + ABC!D + ABCD;

СКНФ: (A+B+C+D)(A+B+C+!D)(A+B+!C+D)(A+B+!C+!D)(A+!B+C+D)(A+!B+C+D)(A+!B+!C+D)(A+!B+!C+!D)(!A+B+C+D)(!A+B+C+!D)(!A+B+!C+D)(!A+B+!C+!D)(!A+!B+C+D)

Г)f(A,B) = !AB + A!B;

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| A | B | !A | !B | !AB | A!B | !AB+A!B | ЭК | ЭД |
| 0 | 0 | 1 | 1 | 0 | 0 | 0 | - | A+B |
| 0 | 1 | 1 | 0 | 1 | 0 | 1 | !AB | - |
| 1 | 0 | 0 | 1 | 0 | 1 | 1 | A!B | - |
| 1 | 1 | 0 | 0 | 0 | 0 | 0 | - | !A+!B |

СДНФ: !AB+A!B

СКНФ: (A+B)(!A+!B)

Д)f(A,B,C) = A!B + A!C + !BC

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| A | B | C | !B | !C | A!B | A!C | !BC | A!B + A!C + !BC | ЭК | ЭД |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | - | A+B+C |
| 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | !A!BC | - |
| 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | - | A+!B+C |
| 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | - | A+!B+!C |
| 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | A!B!C | - |
| 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | A!BC | - |
| 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | AB!C | - |
| 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | - | !A+!B+!C |

СДНФ: !A!BC + A!B!C + A!BC + AB!C;

СКНФ: (A+B+C)(A+!B+C)(A+!B+!C)(!A+!B+!C)

1. (X⬄Y)=>((!X=>Z)=>!Y) ≡ !((XY)+(!X!Y)) + (!(X+Z)+!Y) ≡ (!(XY)!(!X!Y)) + (!X!Z) + !Y ≡ (!X+!Y)(X+Y) + (!X!Z) + !Y ≡ (!X+!Y)(X+Y) + (!X+!Y)(!X+!Z) ≡ !X+!Y
2. ((B!C) ⬄ A)=>(A + !C) ≡ !(AB!C + !A!BC) + A + !C ≡ !A!BC \* AB!C + A + !C ≡ A + !C – ДНФ И КНФ

CДНФ: A + !C ≡ AC+A!C+A!C+!A!C ≡ AC + A!C + !A!C ≡ ABC + A!BC + AB!C + A!B!C + !AB!C + !A!B!C - 6 переменных в сднф

СКНФ: A + !C ≡ (A + B + !C)(A + !B + !C) – 2 переменные в скнф

1. В) (P => Q)(Q => P)(P+Q) ≡ (!P+Q)(!Q+P)(P+Q) ≡ (!P + Q)P ≡ PQ

Г) (P => Q)(Q => !P)(R => P) ≡ (!P+Q)(!Q+!P)(!R+P) ≡ !P(!R+P) ≡ !P!R