Problema 9.3.5.

Simplificaţi următoarele funcţii booleene de patru variabile date prin valorile de 1, utilizând metoda lui Quine:

1. *f*5(1,1,1,1)=1, *f*5(0,1,0,1)=1, *f*5(0,1,1,1)=1, *f*5(1,1,1,0)=1, *f*5(1,1,0,0)=1, *f*5(1,0,0,0)=1, *f*5(1,0,0,1)=1, *f*5(0,0,0,1)=1;

S*f* ={(0,0,0,1),(1,0,0,0), (0,1,0,1),(1,0,0,1),(1,1,0,0), (0,1,1,1),(1,1,1,0), (1,1,1,1)}

Tabelul de factorizare:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Grupul |  | *x*1 | *x*2 | *x*3 | *x*4 |  |
| *I* | *Ö* | 0 | 0 | 0 | 1 | *m*1 |
|  | *Ö* | 1 | 0 | 0 | 0 | *m*8 |
| *II* | *Ö* | 0 | 1 | 0 | 1 | *m*5 |
|  | *Ö* | 1 | 0 | 0 | 1 | *m*9 |
| *Ö* | 1 | 1 | 0 | 0 | *m*12 |
| *III* | *Ö* | 0 | 1 | 1 | 1 | *m*7 |
| *Ö* | 1 | 1 | 1 | 0 | *m*14 |
| *IV*  *Factorizare simplă* | *Ö* | 1 | 1 | 1 | 1 | *m*15 |
|  |  | 0 | - | 0 | 1 | *m*1Ú *m*5 = *max*1=¯ *x*1¯*x*3*x*4 |
| *V*=*I*+*II* |  | - | 0 | 0 | 1 | *m*1Ú *m*9= *max*2=¯ *x*2¯*x*3*x*4 |
|  |  | 1 | 0 | 0 | - | *m*8Ú *m*9= *max*3= *x*1¯ *x*2¯*x*3 |
|  |  | 1 | - | 0 | 0 | *m*8Ú *m*12= *max*4= *x*1¯ *x*3¯*x*4 |
| *VI*=*II*+*III* |  | 1 | 1 | - | 0 | *m*12Ú *m*14= *max*5= *x*1*x*2¯*x*4 |
|  | 0 | 1 | - | 1 | *m*5Ú *m*7= *max*6=¯*x*1*x*2*x*4 |
| *VII*=*III*+*IV* |  | 1 | 1 | 1 | - | *m*14Ú *m*15= *max*7= *x*1*x*2*x*3 |
|  | - | 1 | 1 | 1 | *m*7Ú *m*15= *max*8= *x*2*x*3*x*4 |

*Nu avem Factorizare dublă*

M( *f* )={ *max*1, *max*2, *max*3, *max*4, *max*5, *max*6, *max*7, *max*8 }

Tabelul de identificare a monoamelor centrale:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| mon.  max.  mintermi | *max*1 | *max*2 | *max*3 | *max*4 | *max*5 | *max*6 | *max*7 | *max*8 |
| *m*x | \* |  |  |  |  |  |  |  |
|  | \* |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
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|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |

C( *f* )=Æ

M( *f* )¹ C( *f* ), C( *f* ) =Æ Þ cazul III al algoritmului de simplificare

*f*4’(1)(*x*1, *x*2, *x*3, *x*4)= *h*1(*x*1, *x*2, *x*3, *x*4)= *max*xxÚ *max*xxÚ *max*xxÚ *max*xx=ÚÚÚ

*f*4’(2)(*x*1, *x*2, *x*3, *x*4)= *h*2(*x*1, *x*2, *x*3, *x*4)= *max*xxÚ *max*xxÚ *max*xxÚ *max*xx=ÚÚÚ

Problema 9.3.6.

Simplificaţi următoarele funcţii booleene de trei variabile date prin zerourile acestora, utilizând metoda lui Quine:

1. *f*5(0,0,0) = *f*5(1,1,0) = *f*5(1,1,1) = 0;

Identificarea suportului funcției:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| *x*1 | *x*2 | *x*3 |  |  |  |  |  |
| 0 | 0 | 0 |  |  |  |  |  |
| 0 | 0 | 1 |  |  |  |  |  |
| 0 | 1 | 0 |  |  |  |  |  |
| 0 | 1 | 1 |  |  |  |  |  |
| 1 | 0 | 0 |  |  |  |  |  |
| 1 | 0 | 1 |  |  |  |  |  |
| 1 | 1 | 0 |  |  |  |  |  |
| 1 | 1 | 1 |  |  |  |  |  |

S*f* ={(,,,),,,,,,,}

Tabelul de factorizare:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Grupul | *Ö* | *x*1 | *x*2 | *x*3 | =¯ *x*2¯*x*3 = *max*1 |
| *I* |  |  |  |  | *m*xx |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| *II* |  |  |  |  |  |
|  |  |  |  |  |
| *III* |  |  |  |  |  |
|  |  |  |  |  |
| *IV*  *Factorizare simplă* |  |  |  |  |  |
|  |  |  |  |  | *m*xxÚ *m*xx=… |
| *V*=*I*+*II* |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| *VI*=*II*+*III* |  |  |  |  |  |
|  |  |  |  |  |
| *VII*=*III*+*IV*  *Factorizare dublă* |  |  |  |  |  |
|  |  |  |  |  |

*Factorizare triplă*

M( *f* )={…}

Tabelul de identificare a monoamelor centrale:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| mon.  max.  mintermi | *max*1 | *max*2 | *max*3 | *max*4 | *max*5 | *max*6 | *max*7 | *max*8 |
| *m*x | \* |  |  |  |  |  |  |  |
|  | \* |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
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|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |

C( *f* )={}

M( *f* )¹ C( *f* ), C( *f* ) ¹Æ Þ cazul II al algoritmului de simplificare

*g*(*x*1, *x*2, *x*3)= *max*xxÚ *max*xxÚ *max*xxÚ *max*xx=ÚÚÚ

*f*4’(1)(*x*1, *x*2, *x*3)= *g*(*x*1, *x*2, *x*3) Ú *h*1(*x*1, *x*2, *x*3, *x*4)= *max*xxÚ *max*xxÚ *max*xxÚ *max*xx=ÚÚÚ

*f*4’(2)(*x*1, *x*2, *x*3)= *g*(*x*1, *x*2, *x*3) Ú *h*2(*x*1, *x*2, *x*3, *x*4)= *max*xxÚ *max*xxÚ *max*xxÚ *max*xx=ÚÚÚ