Problema 9.3.8.

Desenaţi circuitul logic asociat funcţiei booleene de mai jos, simplificaţi funcţia şi desenaţi circuitele logice corespunzătoare tuturor formelor simplificate ale funcţiei, utilizând doar porţi de bază:

1. *f*7(*x*, *y*, *z*) *=* *x* (*y* ⊕ ¯*z*) ∨ *y* (¯*x* ⊕ *z*) ∨ *x* (*y* ↓ *z*) ∨ (*x* ↓ *y*) ¯*z* .

Circuitul inițial:

*f*7(*x,y,z*)

*y*

*x*

*z*

*y* ⊕ ¯*z*

*x* (*y* ⊕ ¯*z*)

¯*x* ⊕ *z*

*y* (¯*x* ⊕ *z*)

*y* ↓ *z*

*x* (*y* ↓ *z*)

(*x* ↓ *y*) ¯*z*

*x*↓ *y*

Dete *x* (*y* ⊕ ¯*z*) ∨ *y* (¯*x* ⊕ *z*) ∨ *x* (*y* ↓ *z*) ∨ (*x* ↓ *y*) ¯*z* r

minarea FCD:

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *x* | *y* | *z* | *y* ⊕ ¯*z* | *x* (*y* ⊕ ¯*z*) | ¯*x* ⊕ *z* | *y* (¯*x* ⊕ *z*) | *y* ↓ *z* | *x* (*y* ↓ *z*) | *x* ↓ *y* | (*x* ↓ *y*) ¯*z* | *f7*(*x,y,z*) | *m* |
| 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | *m*0 |
| 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |  |
| 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | *m*2 |
| 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |
| 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | *m*4 |
| 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |  |
| 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | *m*7 |

Diagrama Karnaugh:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *yz*  *x* | 00 | 01 | 11 | 10 |
| 0 | *m*0 | *m*1 | *m*3 | *m*2 |
| 1 | *m*4 | *m*5 | *m*7 | *m*6 |

*max*1=*m*0∨ *m*4= ¯*y* ¯*z*

*max*2=*m*0∨ *m*2= ¯*x* ¯*z*

*max*2=*m*7=*xyz*

M(*f* ) = { *max*1, *max*2, *max*3}

C(*f* ) = { *max*1, *max*2, *max*3}

M(*f* ) = C(*f* ) ⇒ ca*z*ul I

*f**7*‘(1)(*x,y,z*)= *max*1∨ *max*2∨ *max*3 = ¯*y* ¯*z* ∨ ¯*x* ¯*z* ∨ *xyz*

Un circuit simplificat:

*f* 7‘(*x,y,z*)

*y*

*x*

*z*

¯*y* ¯*z*

¯*x* ¯*z*

*xyz*

Problema 9.3.9.

Desenaţi un circuit logic având trei variabile de intrare şi conţinând toate porţile de ba*z*ă şi derivate. Scrieţi funcţia booleană corespun*z*ătoare şi simplificaţi-o, iar apoi desenaţi un circuit logic simplificat.

Circuitul inițial:

(*z* ↑ ¯*y*) *x*

*f* (*x,y,z*)

*y*

*x*

*z*

¯*x* ⊕ *y*

*z* ↑ ¯*y*

*x* ↓ *z*

(*x* ↓ *z*)¯*y*

*y* ¯*z*

*f* (*x,y,z*)=( *x* ⊕ *y*)∨ (*z* ↑ ¯*y*) *x* ∨ (*x* ↓ *z*)¯*y* ∨ *y* ¯*z*

Determinarea FCD:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| *x* | *y* | *z* |  |  |  |  | *fx*(*x,y,z*) |
| 0 | 0 | 0 |  |  |  |  |  |
| 0 | 0 | 1 |  |  |  |  |  |
| 0 | 1 | 0 |  |  |  |  |  |
| 0 | 1 | 1 |  |  |  |  |  |
| 1 | 0 | 0 |  |  |  |  |  |
| 1 | 0 | 1 |  |  |  |  |  |
| 1 | 1 | 0 |  |  |  |  |  |
| 1 | 1 | 1 |  |  |  |  |  |

Diagrama Karnaugh:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *yz*  *x* | 00 | 01 | 11 | 10 |
| 00 | *m*0 | *m*1 | *m*3 | *m*2 |
| 01 | *m*4 | *m*5 | *m*7 | *m*6 |
| 11 | *m*12 | *m*13 | *m*15 | *m*14 |
| 10 | *m*8 | *m*9 | *m*11 | *m*10 |

M(*f* ) = { *max*1, *max*2, *max*3}

C(*f* ) = { *max*1, *max*2}

M(*f* ) ≠ C(*f* ) , C(*f* ) ≠ ∅ ⇒ ca*z*ul II *g* (*x*,*y*,*z*)= *max*1∨ *max*2

*h*1(*x*1*,x*2*,x*3*,x*4)= *max*4

*f**x*‘(1)(*x,y,z*)*= g* (*x,y,z*) ∨ *h*1(*x,y,z*)= *max*3∨ *max*2∨ *max*1∨ *max*4= ¯ *x* ¯ *y*  ¯*z* ∨

Un circuit simplificat:

*f* (*x,y,z*)

*y*

*x*

*z*

*M*2