محمد توکلی ۹۷۳۱۰۱۱۵ استاد صاحب الزمانی

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$ab + a'c + bcd = ab + a'c + (a + a')bcd = ab + a'c + abcd + a'bcd \longrightarrow$

complement

$ab + abcd + a'c + a'cbd \xrightarrow{\text{distributive}} ab(1 + cd) + a'c(1 + bd) = \boxed{ab + a'c}$

commutative

$(a + b')(b + c')(c + a') \xrightarrow{\text{distributive}} (ab + ac' + bb' + b'c')(c + a') = (ab + b'c')(c + a')$

consansas

$\xrightarrow{\text{distributive}} abc + aa'b + b'c'c + b'c'a' = abc + a'b'c' + aa'c + bb'c' \xrightarrow{\text{distributive}}$

صفر صفر صفر صفر

$a'(ac + b'c') + b(ac + b'c') \xrightarrow{\text{distributive}} (a' + b)(ac + b'c') =$

$\boxed{(a' + b)(b' + c)(c' + a)}$

$(abd + a'b + b'd + c')(c + ab + bd) \xrightarrow{\text{distributive}} abcd + abd + abd + a'bc + a'ab + a'bd$

comutative

$+ b'cd + abb'd + bb'd + cc' + abc' + bc'd \longrightarrow abd(c + 1) + a'bc + a'ab + a'bd + b'cd$

$abb'd + bb'd + cc' + abc' + b'cd \longrightarrow abd + a'bc + a'b'd + b'cd + abc' + b'cd \xrightarrow{\text{comutative}}$

$abd + a'bd + a'bc + abc' + b'cd + bc'd = (a + a')bd + b(a'c + ac') + b'cd + bc'd$

$= bd + b(a + c)(a' + c') + b'cd + bc'd = b(a + c)(a' + c') + (c + c')bd + b'cd + bc'd =$

$b(a + c)(a' + c') + bcd + bc'd + b'cd + bd = b(a + c)(a' + c') + (b + b')cd + bc'd + bd$

$= b(a + c)(a' + c') + cd + bd(1 + c') = b(a + c)(a' + c') + bd + cd \xrightarrow{\text{distributive}}$

commutative

$\boxed{b(a + c)(a' + c') + d(b + c)}$

$(a + b)'(a + c) + (a + b)(a + c)' \xrightarrow{\text{demorgan}} (a'b')(a + c) + (a'c')(a + b) \xrightarrow{\text{distributive}}$

$aa'b' + a'b'c + aa'c' + a'bc' \longrightarrow a'b'c + a'bc' = \boxed{a'(b'c + bc')}$

A	B	C	$AB'C'$	$A'B'C$	$A'B'C'$	ABC	$A'C'$	AC	AC'	$A'C$	AB	$A'B$	BC'	f_1	f_2	f_3	f_4
0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	1	1	0
0	0	1	0	1	0	0	0	0	0	1	0	0	0	1	0	0	1
0	1	0	1	0	0	0	0	0	1	0	0	1	1	1	1	0	1
0	1	1	0	0	0	0	0	1	0	0	1	0	0	0	0	1	0
1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	0	1
1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0
1	1	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	1
1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0

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مطابق جدول درستی توابع f_4 و f_1 باهم معادل و توابع f_3 و f_2 باهم معادلند.

$f_1 \sim f_4$

$f_2 \sim f_3$

$F(w,x,y,z) = \sum m(7,10,13,14,15) = m_7 + m_{10} + m_{13} + m_{14} + m_{15} =$ (۳۵

$w'xyz + wx'yz' + wxy'z + wxyz' + wxyz$

$F(w,x,y,z) = \prod M(1,2,4,9,11) = M_1 + M_2 + M_4 + M_9 + M_{11} =$

$wxyz' + wxy'z + wx'yz + w'xyz' + w'xy'z'$

$F(a,b,c,d) = \sum m(0,1,4,5,8,12,14,15) = m_0 + m_1 + m_4 + m_5 + m_8 + m_{12} + m_{14} + m_{15}$

$= a'b'c'd' + a'b'c'd + a'bc'd' + a'bc'd + a'b'cd' + abc'd' + abcd' + abcd$

---

a	b	c	d	خروجی f
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	0
0	1	0	0	0
0	1	0	1	0
0	1	1	0	0
0	1	1	1	1
1	0	0	0	0
1	0	0	1	0
1	0	1	0	0
1	0	1	1	1
1	1	0	0	0
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1

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محمد تولایی ۹۷۳۱۰۱۴ استاد صاحب الزمانی

$$F = (A'+B+C)' + (B(AC')')'$$

$$G = ((B+C)' \cdot (D+(A'B)'))$$

ج) مطابق مدار زیر کدام از شرایط ذکر شده اتفاق نیفتد خروجی مدار صفر شده و آژیر به صدا در نمی آید.

$(AB') \cdot (C'D') \cdot (A'D)$