یا لطیف

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#1 الف) $1+14/2=10 \Rightarrow 14/2=9 \Rightarrow (b+4)/2=9 \Rightarrow \boxed{b=14}$

ب) $(54/4)-1=12 \Rightarrow (54/4)=13 = (5\times b+4)/4 = b+3 \Rightarrow b\times 5 = 52-4$
$\Rightarrow b=8$

ج) $32+14=40 \Rightarrow (2\times b+3)+(b+4)=4b \Rightarrow \boxed{b=7}$

د) $x^2-12x+27=1 \quad \begin{cases} x=3 \\ x=8 \end{cases} \Rightarrow (x-3)(x-9) = x^2-(8+3)x+(8\times 3) = x^2-12x+27$

$\boxed{x=3}$

#2

a) $(a+\bar{b})\cdot(a+\bar{c})\cdot(\bar{a}+b+\bar{c}) = F \longrightarrow \bar{F} = ?$

$= \left(\overline{(a+\bar{b})\cdot(a+\bar{c})\cdot(\bar{a}+b+\bar{c})}\right) = \overline{(a+\bar{b})} + \overline{(a+\bar{c})} + \overline{(\bar{a}+b+\bar{c})}$

$= (\bar{a}\cdot b) + (\bar{a}c) + (a\bar{b}c) = \bar{F}$

b) $x\bar{y}z + \bar{x}\bar{y}z + \bar{w}xy + w\bar{x}y + wxy = A \longrightarrow \bar{A} = ?$

$\overline{\left((x\bar{y}z)+(\bar{x}\bar{y}z)+(\bar{w}xy)+(w\bar{x}y)+(wxy)\right)} = \overline{(x\bar{y}z)}\cdot\overline{(\bar{x}\bar{y}z)}\cdot\overline{(\bar{w}xy)}\cdot\overline{(w\bar{x}y)}\cdot\overline{(wxy)}$

$= (\bar{x}+y+\bar{z})\cdot(x+y+\bar{z})\cdot(w+\bar{x}+\bar{y})\cdot(\bar{w}+x+\bar{y})\cdot(\bar{w}+\bar{x}+\bar{y}) = \bar{A}$

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#3 $F(x_1, x_2, x_3, \dots, x_n) = \sum m_i$

می دانیم $\underset{*}{\underline{x_n + \bar{x}_n = 1}} \Rightarrow F = \bar{x}_1\bar{x}_2\bar{x}_3\cdots + \bar{x}_1\bar{x}_2x_3\cdots + \dots + x_1x_2x_3\cdots$

$= \bar{x}_1(\bar{x}_2\bar{x}_3\cdots + \bar{x}_2x_3\cdots + \dots + x_2x_3\cdots) + x_1(\bar{x}_2\bar{x}_3\cdots + \bar{x}_2x_3\cdots + \dots + x_2x_3\cdots)$

$\overset{*}{=} \cancel{(\bar{x}_1 + x_1)}(\bar{x}_2\bar{x}_3\cdots + \bar{x}_2x_3\cdots + x_2x_3\cdots) \xlongequal[\text{کلی}]{\text{در حالت}} \underbrace{(x_n + \bar{x}_n)H = 1}$

$\longrightarrow \begin{cases} x_nH + \bar{x}_nH \\ H = 1 \end{cases}$

#4

a) $F = \bar{a}d + \bar{c}a\bar{b} + c(\bar{a}b + a\bar{b}) \Rightarrow F(a,b,c,d) =$

$= \bar{a}d(b+\bar{b})(c+\bar{c}) + \bar{c}a\bar{b}(d+\bar{d}) + \bar{a}bc(d+\bar{d}) + a\bar{b}c(d+\bar{d})$

$= \bar{a}bcd + \bar{a}b\bar{c}d + \bar{a}\bar{b}cd + \bar{a}\bar{b}\bar{c}d + a\bar{b}\bar{c}d + a\bar{b}\bar{c}\bar{d} + \bar{a}bcd + \bar{a}bc\bar{d} + a\bar{b}cd + a\bar{b}c\bar{d}$

=

ab \ cd	00	01	11	10
00		1	1	
01		1	1	1
11				
10	1	1	1	1

$F(a,b,c,d) = a\bar{b} + \bar{a}d + \bar{a}bc$: SOP

ab \ cd	00	01	11	10
00	0			0
01	0			
11	0	0	0	0
10				

$\bar{F} = ab + \bar{a}\bar{c}\bar{d} + \bar{a}b\bar{d} \xrightarrow{\text{متمم می گیریم}}$

$F = (\bar{a}+\bar{b}) \cdot (a+c+d) \cdot (a+b+d)$: POS

ادامه سوال 4 :

b) $F = (\bar a + b + \bar d)(\bar a + \bar b + \bar c)\cdot(\bar a + \bar b)(\bar b + c)$

$= (\bar a\bar a + \bar a\bar b + \bar a\bar c + \bar a b + \cancel{b\bar b} + b\bar c + \bar a\bar d + \bar d\bar b + \bar d\bar c)\cdot(\bar a\bar b + \bar a c + \bar b\bar b + \bar b c)$

$= \cancel{\bar a\bar b} + \cancel{\bar a c} + \cancel{\bar a\bar b} + \cancel{\bar a\bar b c} + \cancel{\bar a\bar b} + \cancel{\bar a\bar b c} + \cancel{\bar a\bar b} + \cancel{\bar a\bar b c} + \cancel{\bar a\bar c b} + \bar a\bar c b + \cancel{\bar a b c}$

$+ \cancel{\bar a\bar b c} + \bar a\bar d\bar b + \bar a\bar d c + \bar a\bar d b + \cancel{\bar a\bar d\bar b c} + \cancel{\bar d\bar b\bar a} + \cancel{\bar d\bar b\bar a c} + \cancel{\bar d\bar b} + \cancel{\bar d\bar b c} + \cancel{\bar d\bar c\bar a\bar b}$

$+ \cancel{\bar d\bar c\bar a\bar b}$

$= \bar a\bar b + \bar a c + \bar d\bar b + \bar a\bar b c + \bar a\bar c\bar b + \bar a b c + \bar a\bar d\bar b + \bar a\bar d c + \bar a\bar d b + \bar d\bar b c + \bar b\bar c\bar d$

$+ \bar a\bar d\bar b c + \bar a\bar b\bar c\bar d$

$= \bar a\bar b(c+\bar c)(d+\bar d) + \bar a c(b+\bar b)(d+\bar d) + \bar d\bar b(a+\bar a)(c+\bar c) + \bar a\bar b c(d+\bar d)$

$+ \bar a\bar c\bar b(d+\bar d) + \bar a b c(d+\bar d) + \bar a\bar d\bar b(c+\bar c) + \bar a\bar d c(b+\bar b) + \bar a\bar d b(c+\bar c) + \bar d\bar b c(a+\bar a)$

$+ \bar b\bar c\bar d(a+\bar a) + \bar a\bar d\bar b c + \bar a\bar b\bar c\bar d$