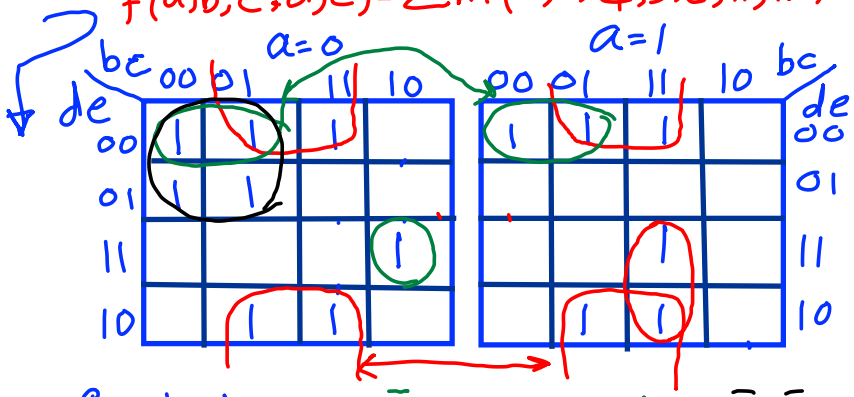
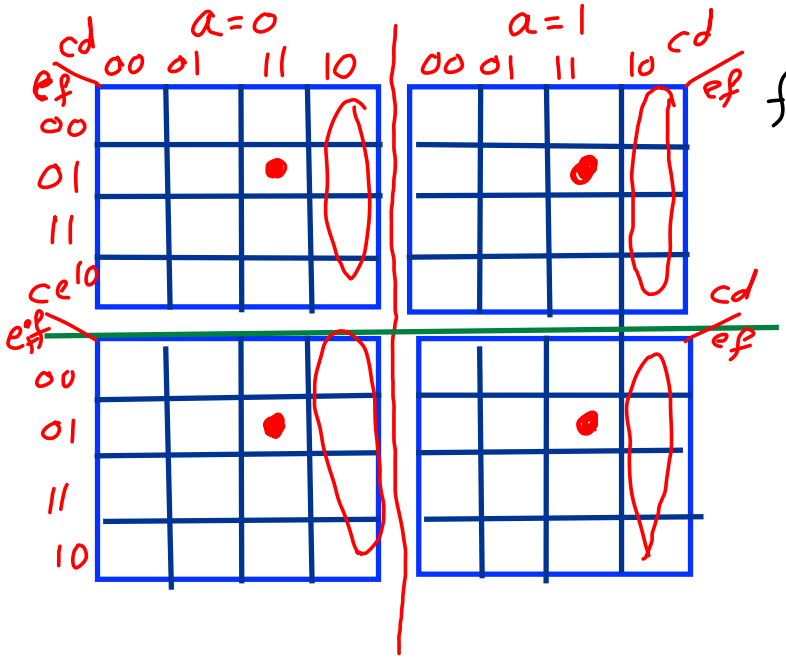
$f(a,b,c,d,e)=\sum m(0,1,4,5,6,11,12,14,16,20,22,28,30,31)$



EPI

$f=abcd+c\bar{e}+\bar{b}\bar{d}\bar{e}+\bar{a}b\bar{c}de+\bar{a}\bar{b}\bar{d}$



$f(a,b,c,d,e,f)$

b=0

b=1

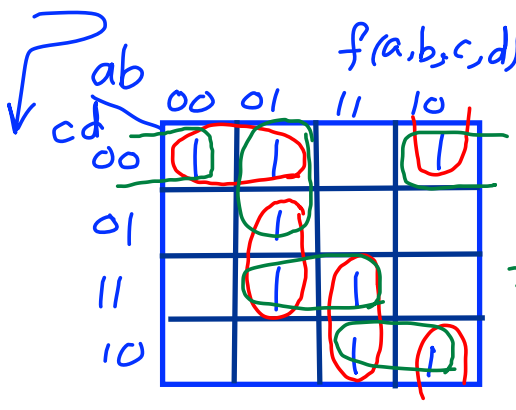
$f(a,b,c,d)=\sum m(0,2,7,8,14)+d(1,5,9,11)$

$f(a,b,c,d)=\prod M(3,4,6,10,12,13,15)\cdot D(1,5,9,11)$

$\cdot d(1,5,9,11)$

$\cdot \prod D(1,5,9,11)$

$, d(1,5,9,11)$

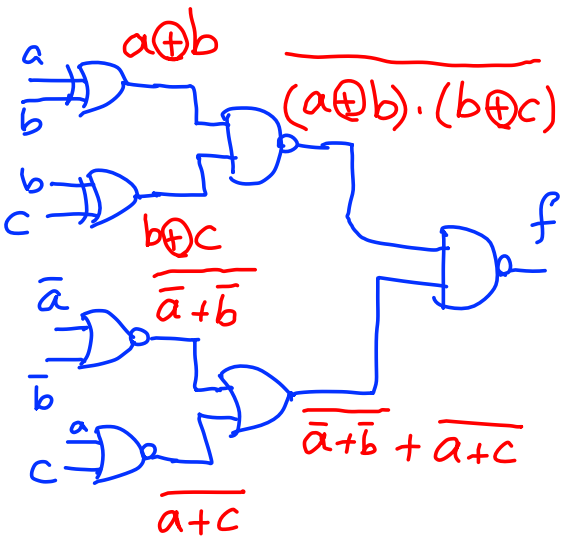


$f(a,b,c,d)=\sum m(0,4,5,7,8,10,14,15)$ الحل

نجد EPI

$f=\acute{a}\acute{c}\acute{d}'+\acute{a}\acute{b}d+abc+ab\acute{d}'$

$f=\acute{b}\acute{c}\acute{d}'+\acute{a}\acute{b}c'+bcd+ac\acute{d}'$ }=



تابع مربوط به مدار مقابل را بدست آورید.

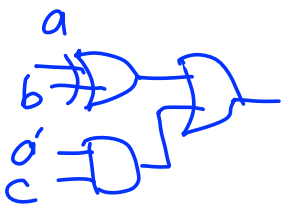
$$f = \overline{(a\oplus b)\cdot(b\oplus c)} \cdot \overline{(\bar{a}+\bar{b}+\overline{a+c})}$$

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

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

$$= (ab'+a'b)(bc'+b'c) + (\cancel{a'a}+a'c+ab'+\cancel{b'c})$$

$$= (\cancel{ab'b'c}+ab'\cdot b'c+a'bbc'+\cancel{a'bb'c}) + (a'c+ab')$$



$$= (ab'c+a'bc') + (a'c+ab')$$

$$= ab'+a'(bc'+c) = ab'+a'(b+c)$$

$$= ab'+a'b+a'c = (a\oplus b)+a'c$$

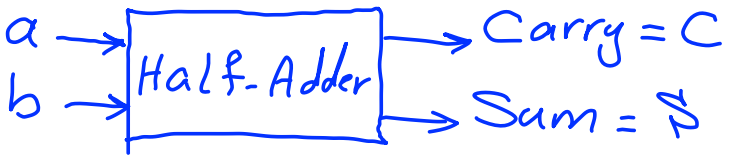
$$(bc'+c) = (c+b)\cdot(\underbrace{c+c'}_{1})$$

طراحی منطقی

Integrated circuit (IC): مدار مجتمع

مدار جمع کننده (Adder)

$$\begin{array}{r} C_2\ C_1 \\ A = a_2 a_1 a_0 + \\ B = b_2 b_1 b_0 \\ \hline C_3\ S_2\ S_1\ S_0 \end{array}$$

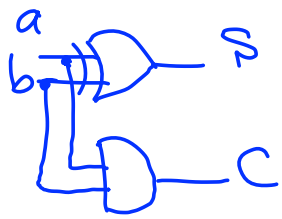


نیم جمع کننده

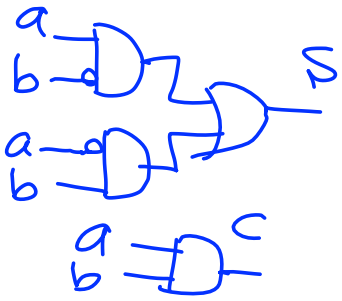
a b	C	S
0 0	0	0
0 1	0	1
1 0	0	1
1 1	1	0

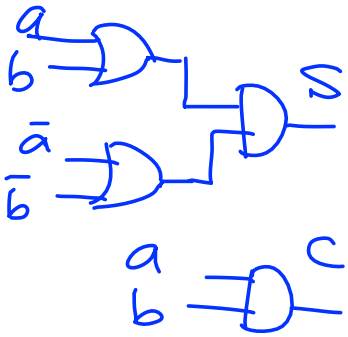
$$S = a'b+ab' = a\oplus b = (a+b)\cdot(\bar{a}+\bar{b})$$

$$C = a\cdot b$$



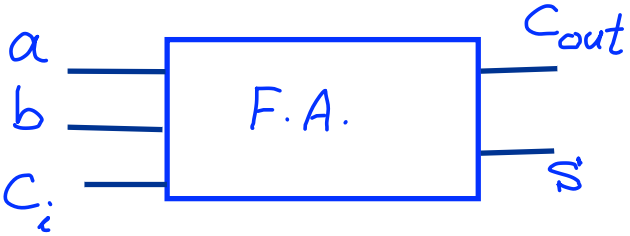
HA

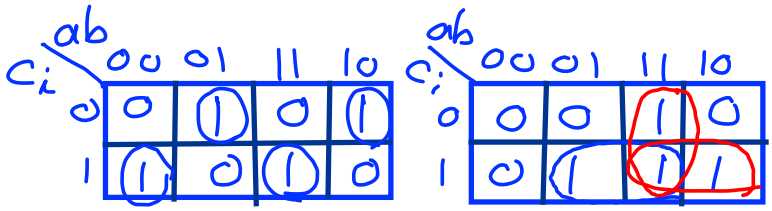




full adder (FA) جمع کننده تمام

a	b	c_i	C_{out}	S
0	0	0	0	0
0	0	1	0	1
0	1	0	0	1
0	1	1	1	0
1	0	0	0	1
1	0	1	1	0
1	1	0	1	0
1	1	1	1	1





$S = \bar{a}\bar{b}c_i + \bar{a}b\bar{c}_i + ab c_i + a\bar{b}\bar{c}_i = a \oplus b \oplus c_i$

$C_{out} = bc + ac + ab$

Majority function