Truth Table and K-Maps for g, l, e pins

Page No. :

Date :

Truth table for 2-bit Bit comparator.

A1	A0	B1	B0	g	e	l
0	0	0	0	0	1	0
0	0	0	1	0	0	1
0	0	1	0	0	0	1
0	0	1	1	0	0	1
0	1	0	0	1	0	0
0	1	0	1	0	1	0
0	1	1	0	0	0	1
0	1	1	1	0	0	1
1	0	0	0	1	0	0
1	0	0	1	1	0	0
1	0	1	0	0	1	0
1	0	1	1	0	0	1
1	1	0	0	1	0	0
1	1	0	1	1	0	0
1	1	1	0	1	0	0
1	1	1	1	0	1	0

k- Maps

For $\underline{g}$.

$A_1A_0 \backslash B_1B_0$	00	01	11	10
00				
01	1			
11	1	1		1
10	1	1		

(B_1 over the last two columns, B_0 under the middle two columns; A_0 beside the middle two rows, A_1 beside the last two rows)

$$\cancel{g := A_1 B_1' + A_0 B_1' B_0' + A_1 A_0 B_0'}$$

$$g := A_1 \overline{B_1}' + A_0 \overline{A_1}\, \overline{B_0}\, \overline{B_1} + A_0 A_1 \overline{B_0} B_1$$

$$= \boxed{A_1 \overline{B_1} + A_0 \overline{B_0} \left(\overline{A_1 \oplus B_1}\right)}$$

A1'B1' + A1B1 = ((A1'+B1').(A1+B1))'
= (A1 XOR B1)' = A1 XNOR B1

For $\underline{e}$

$A_1A_0 \backslash B_1B_0$	00	01	11	10
00	1			
01		1		
11			1	
10				1

(B_1 over the last two columns, B_0 under the middle two columns; A_0 beside the middle two rows, A_1 beside the last two rows)

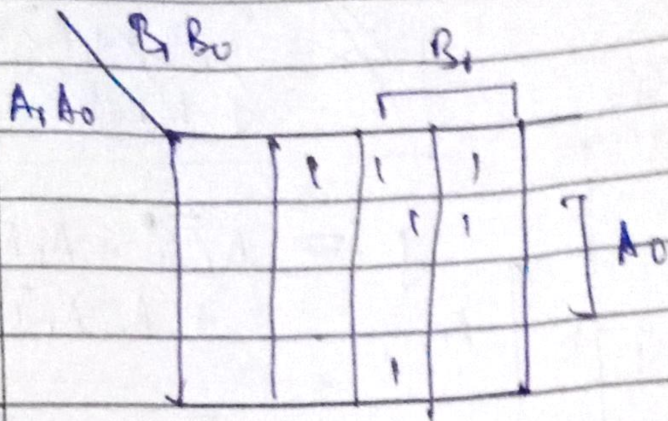
e = A0A1'B0'B1' + A0'A1B0'B1' +
A0'A1'B0B1' + A0'A1'B0'B1

This can be further reduced to
(A0 XNOR B0) . (A1 XNOR B1)

(similar to the above proof)

$$\left(\overline{A_1 \oplus B_1}\right) \cdot \left(\overline{A_0 \oplus B_0}\right)$$

For L,



$L := \cancel{A_1 \oplus B}$

$\bar{A}_1 B_1 + \bar{A}_0 B_0 \bar{A}_1 \bar{B}_1 + \bar{A}_0 B_0 A_1 B_1$

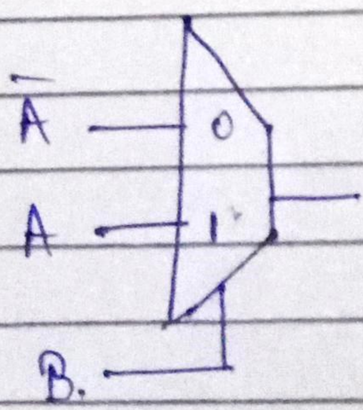
= A1' B1 + A0' B0 (A1'B1' + A1B1)

$= \bar{A}_1 B_1 + \bar{A}_0 B_0 \left(\overline{A_1 \oplus B_1} \right)$

↓

XNOR

A1' B1' + A1B1 = A1 XNOR B1.
(derived above)



$\overline{A_1 \oplus B_1}$

XNOR gate using 2x1 MUX