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Homework #4

Implement the function $F(A,B,C,D) = \sum m(0,1,3,4,8,9,15)$

a) 8-to-1 Mux — using Implementation table method.

A, B and C will be connected to the selection lines and D

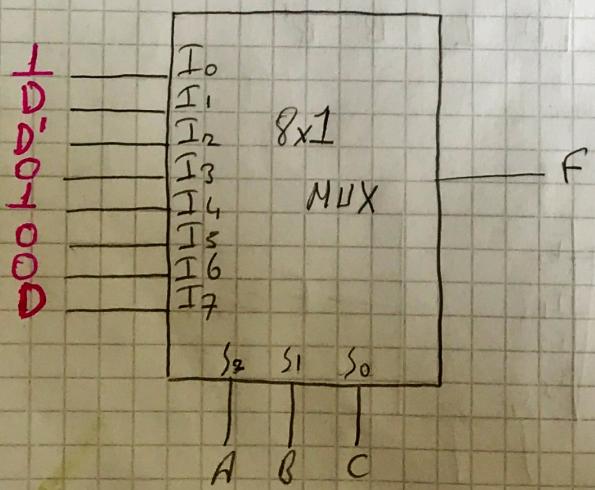
	A	B	C	D	F
m_0	0	0	0	0	1
m_1	0	0	0	1	1
m_2	0	0	1	0	0
m_3	0	0	1	1	1
m_4	0	1	0	0	1
m_5	0	1	0	1	0
m_6	0	1	1	0	0
m_7	0	1	1	1	0
m_8	1	0	0	0	1
m_9	1	0	0	1	1
m_{10}	1	0	1	0	0
m_{11}	1	0	1	1	0
m_{12}	1	1	0	0	0
m_{13}	1	1	0	1	0
m_{14}	1	1	1	0	0
m_{15}	1	1	1	1	1

$2^3 = 8$

A, B, C → selections

D → input

	$A'B'C'$	$A'B'C$	$A'BC'$	$A'BC$	$AB'C'$	$AB'C$	ABC'	ABC
	I_0	I_1	I_2	I_3	I_4	I_5	I_6	I_7
D'	0	2	4	6	8	10	12	14
D	1	3	5	7	9	11	13	15
	1	D	D'	0	1	0	0	D



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b) 4 to 1 MUX

using truth table

C and D will be connected to the Selection A and B

A	B	C	D	F
0	0	0	0	1
0	0	0	1	1
0	0	1	0	0
0	0	1	1	1
0	1	0	0	1
0	1	0	1	0
0	1	1	0	0
0	1	1	1	0
1	0	0	0	1
1	0	0	1	1
1	0	1	0	0
1	0	1	1	0
1	1	0	0	0
1	1	0	1	0
1	1	1	0	0
1	1	1	1	1

C and D → used for selection Lines

A and B → used for data inputs

CD = 00 I_0

A	B	F
0	0	1
0	1	1
1	0	1
1	1	0

A \ B	0	1
0	1	1
1	1	

$F = A'B' + A'B + AB'$

$F = A' + B'$

CD = 01 I_1

A	B	F
0	0	1
0	1	0
1	0	1
1	1	0

A \ B	0	1
0	1	
1	1	

$F = A'B' + AB'$

$F = B'$

CD = 10 I_2

A	B	F
0	0	0
0	1	0
1	0	0
1	1	0

A \ B	0	1
0		
1		

$F = 0$

CD = 11 I_3

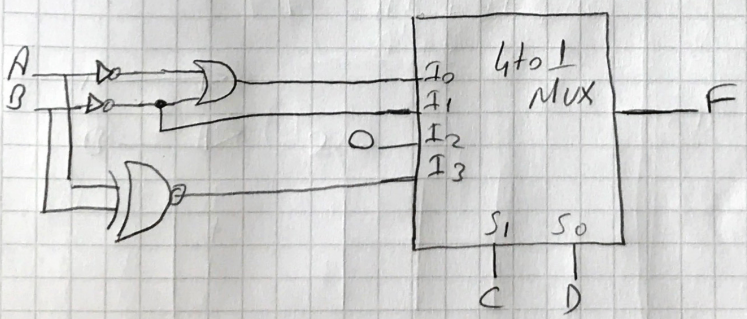
A	B	F
0	0	1
0	1	0
1	0	0
1	1	1

A \ B	0	1
0	1	
1		1

$F = A'B' + AB$

$= (A \oplus B)'$

$= A \odot B$



C	D	F
0	0	$A'+B'$
0	1	B'
1	0	0
1	1	$A \odot B$