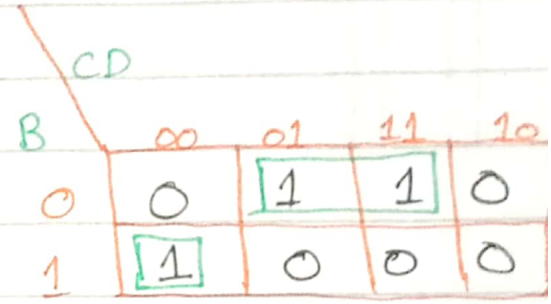
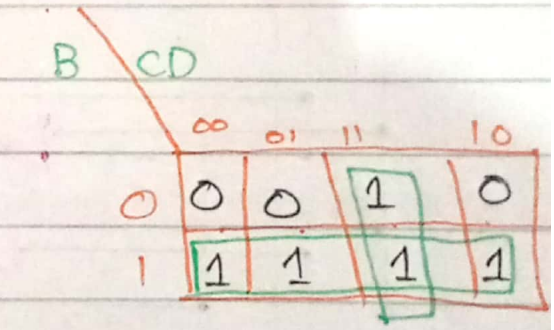
Design and Implement 2x1 MUX for the following function.

$$F = \Sigma\,(1,3,4,11,12,13,14,15)$$

Truth-Table:

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





Equations

$1 \Rightarrow B\bar{C}\bar{D} + \bar{B}\bar{D}$

$2 \Rightarrow CD + \bar{B}$

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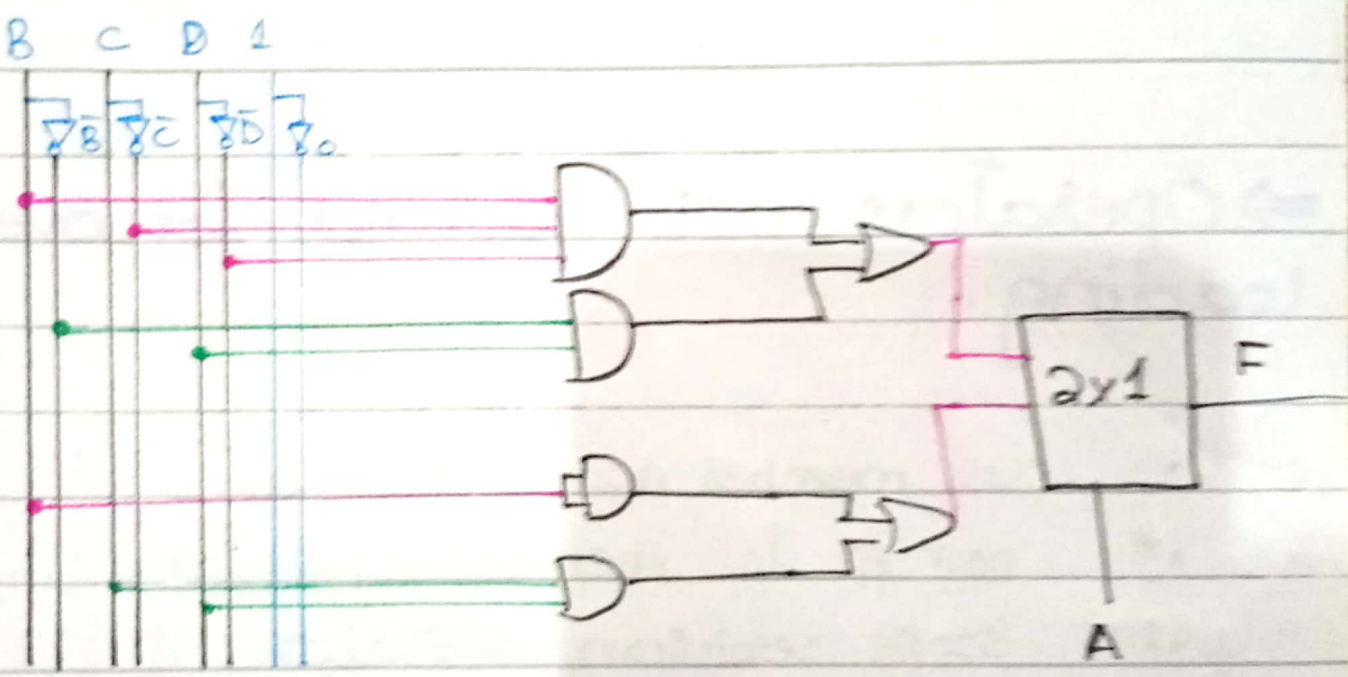
Circuit



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$$F = (A, B, C, D) = \Sigma(2, 4, 5, 6, 8, 9, 13, 14)$$

A	B	C	D	F	8x1	4x1	2x1
0	0	0	0	0	F=0		
0	0	0	1	0		$F=C\bar{D}$	
0	0	1	0	1	$F=\bar{D}$		
0	0	1	1	0			
0	1	0	0	1	F=1		
0	1	0	1	1		$F=\overline{CD}$	
0	1	1	0	1	$F=\bar{D}$		
0	1	1	1	0			
1	0	0	0	1	F=1	$F=\overline{C}$	
1	0	0	1	1			
1	0	1	0	0	F=0		
1	0	1	1	0			
1	1	0	0	0	F=D		
1	1	0	1	1		$F=C\oplus D$	
1	1	1	0	1	$F=\bar{D}$		
1	1	1	1	0			

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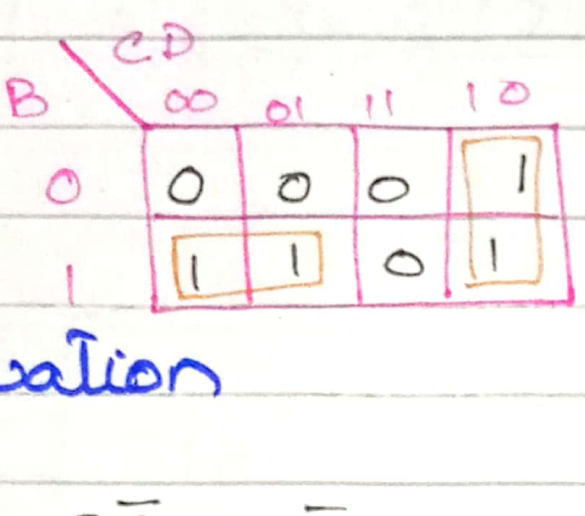
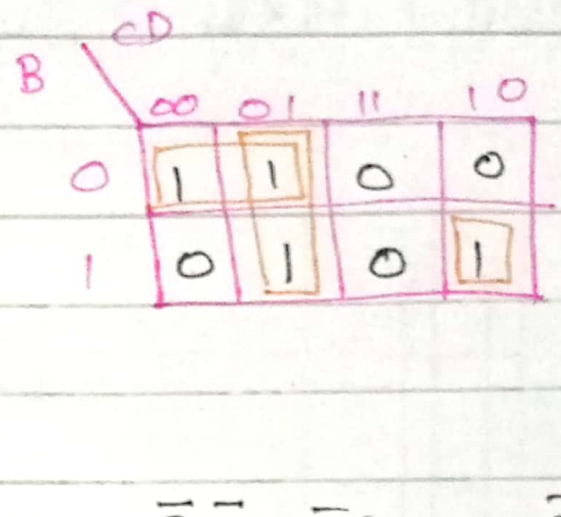
K-map for 2×1





equation

$B\bar{C} + C\bar{D}$

$\bar{B}\bar{C} + \bar{C}D + BC\bar{D}$

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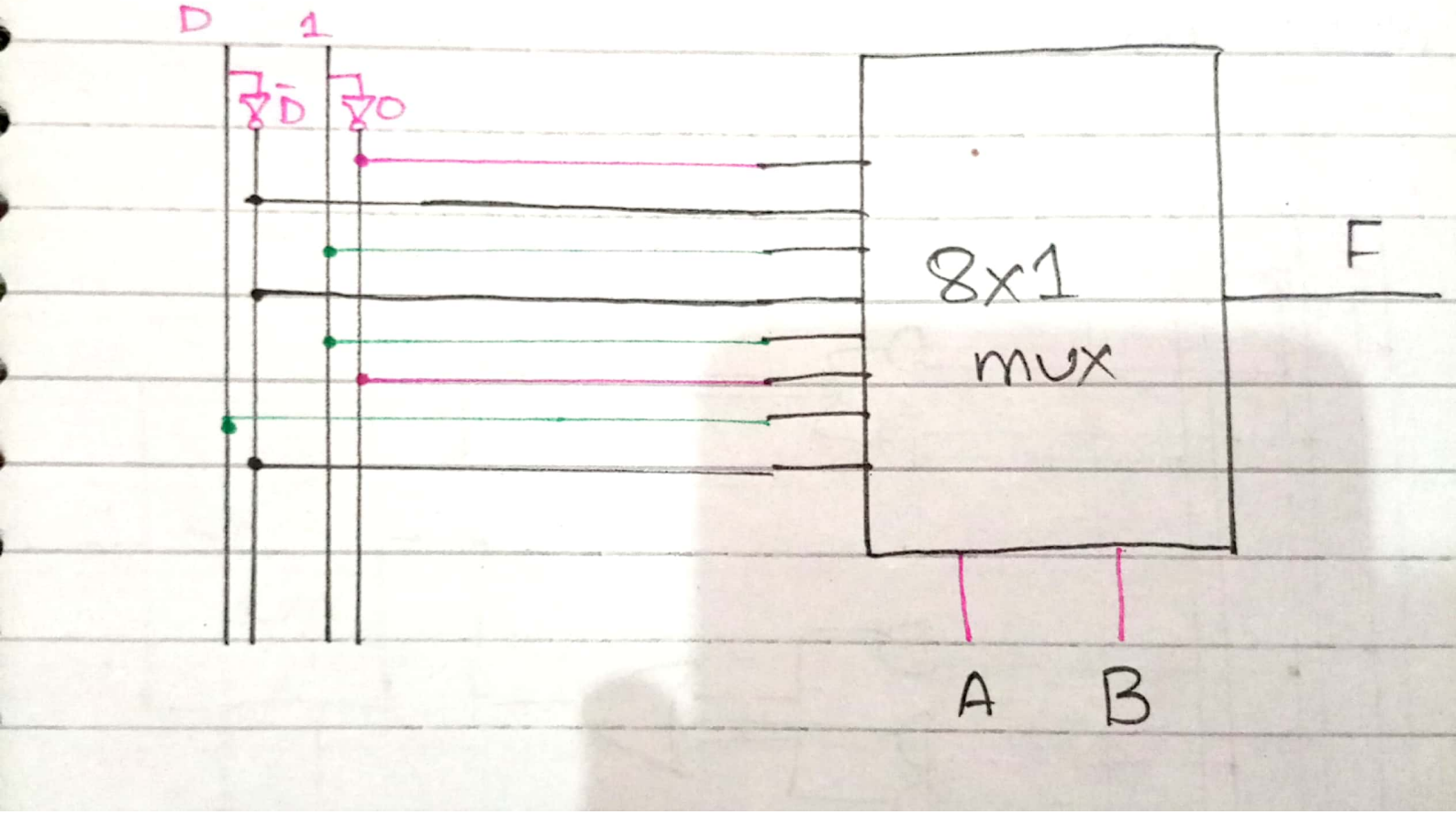
Circuit



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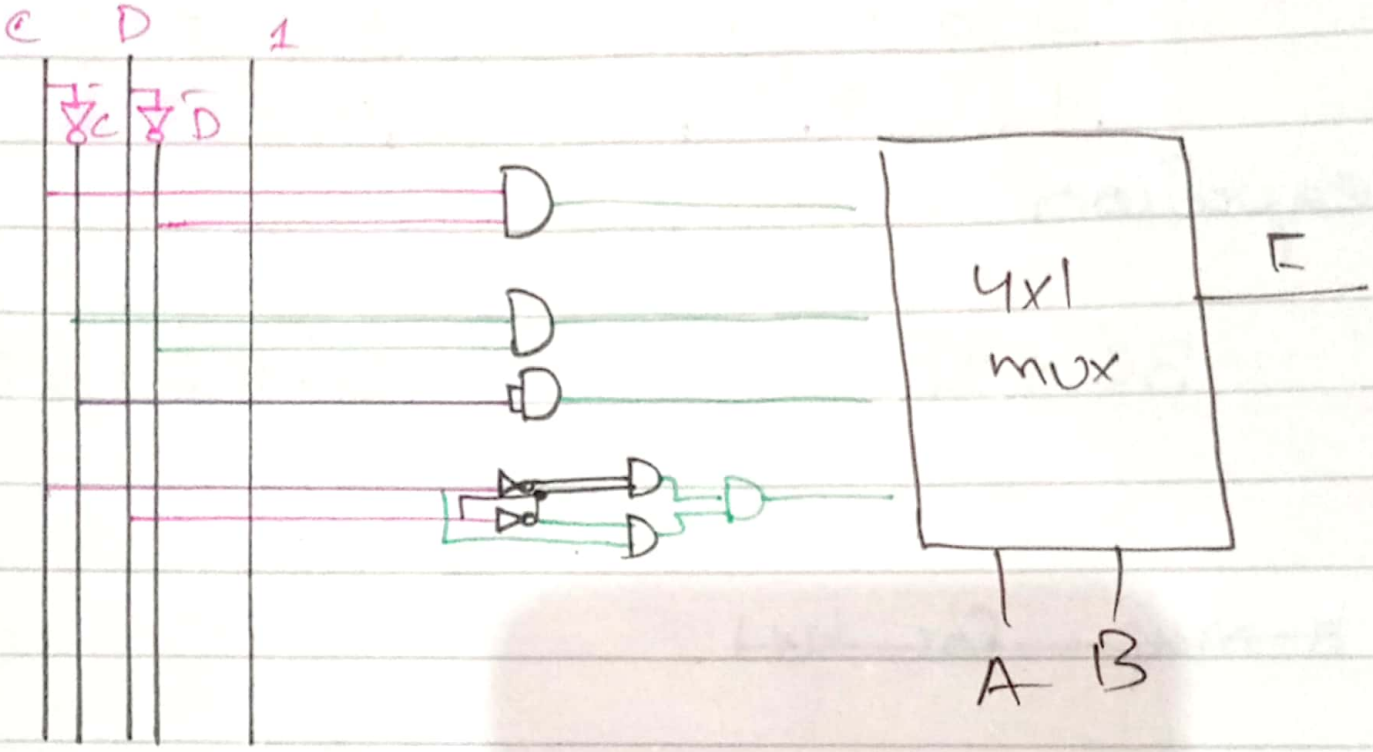
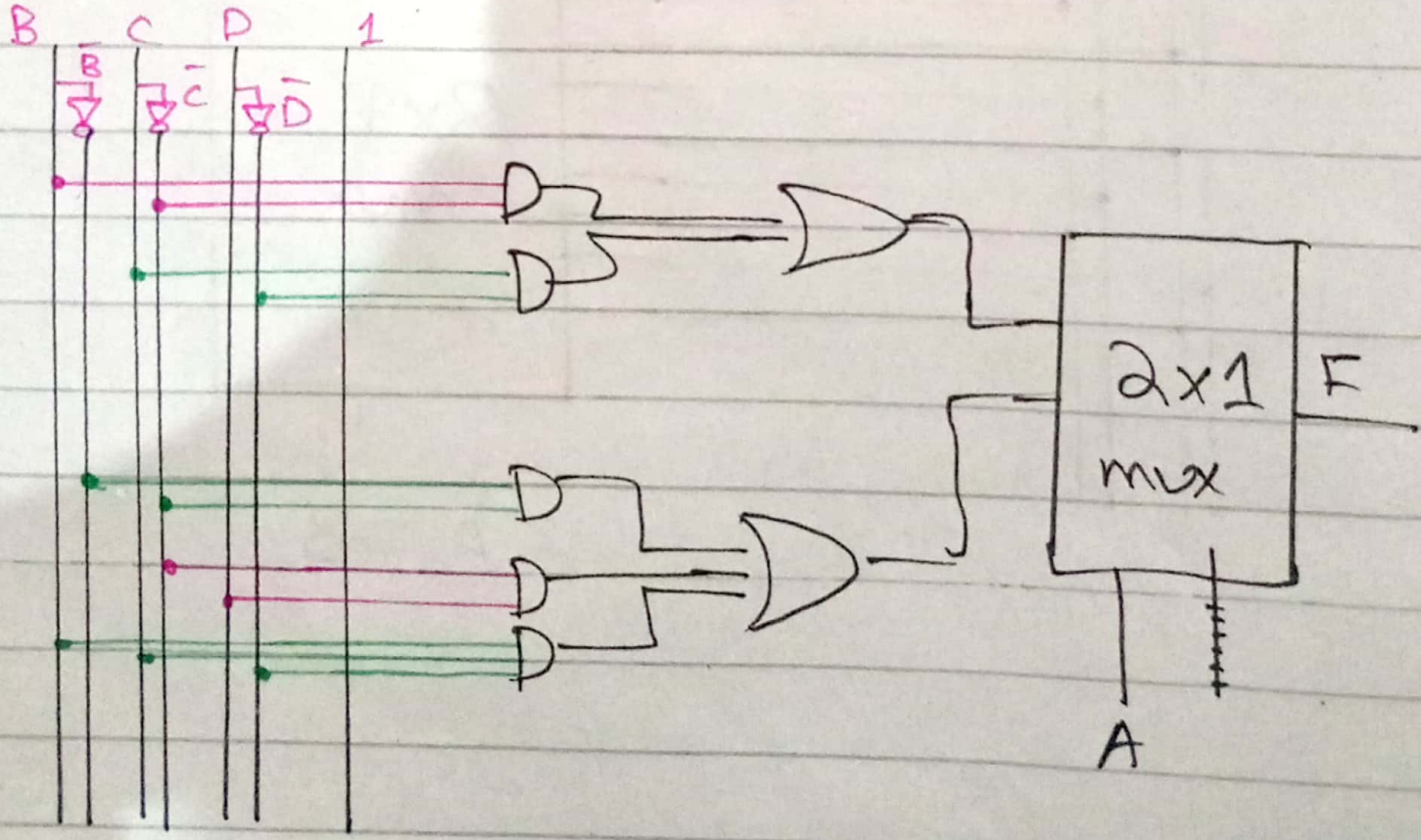
Circuit 4x1



Circuit 2x1



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$F = \Sigma m(1,3,4,11,12,13,14,15)$

A	B	C	D		
0	0	0	0	F=D	F=D
0	0	0	1		
0	0	1	0		F=D
0	0	1	1		
0	1	0	0	$\overline{C+D}$	$F=\overline{D}$
0	1	0	1		
0	1	1	0		F=0
0	1	1	1		
1	0	0	0	CD	F=0
1	0	0	1		
1	0	1	0		F=D
1	0	1	1		
1	1	0	0	1	F=1
1	1	0	1		
1	1	1	0		F=1
1	1	1	1		

for 4x1

for 8x1

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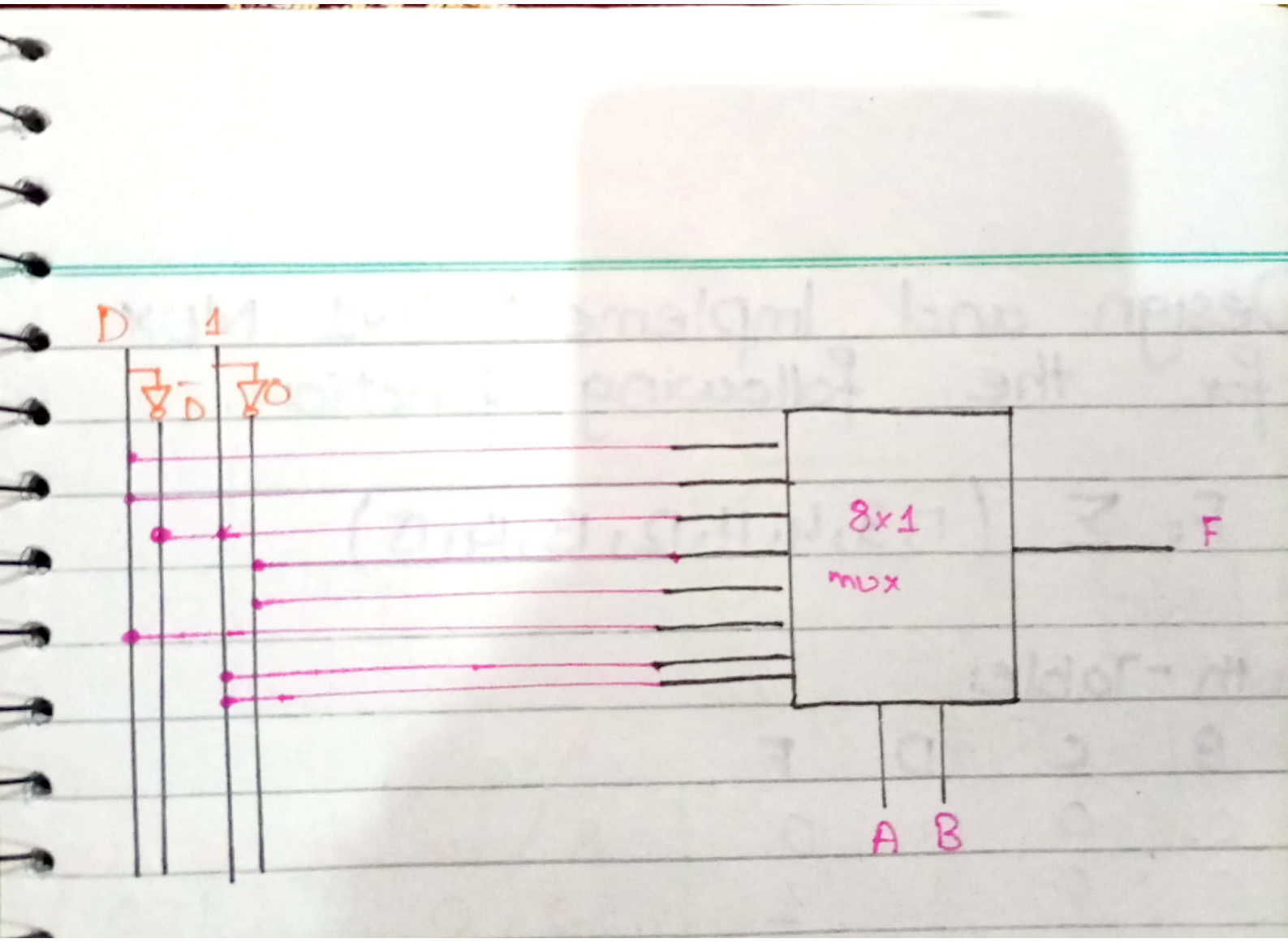

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