Lec-34

BCD to Excess-3:

0000
0001
- - -
- - -
1001

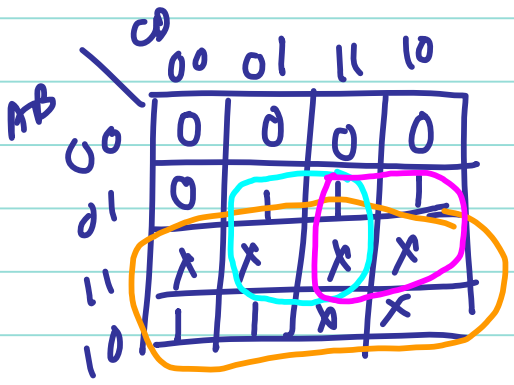
0+ 1010 → X 10

Input A	B	C	D	output W	X	Y	Z
0	0	0	0	0	0	1	1
0	0	0	1	0	1	0	0
0	0	1	0	0	1	0	1
0	0	1	1	0	1	1	0
0	1	0	0	0	1	1	1
0	1	0	1	1	0	0	0
0	1	1	0	1	0	0	1
0	1	1	1	1	0	1	0
1	0	0	0	1	0	1	1
1	0	0	1	1	1	0	0
1	0	1	0	X	X	X	X
-	-	-	-				
-	-	-	-	X	X	X	X
1	1	1	1				

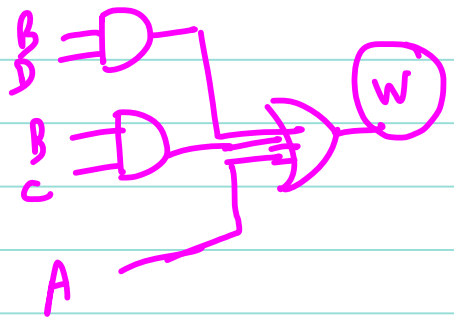
Valid.

A, B, C, D can't have these values Not valid.

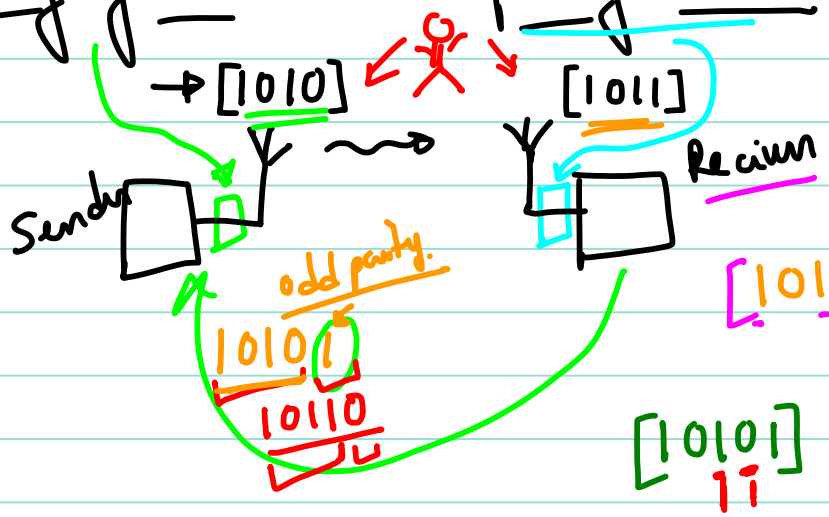
Don't care combinations.



$W = A + BD + BC$



Parity generator and parity checker circuits:



[10111] X

limitation → Error Detection

[10101] → [10111] ✓
11

→ [10011] X
11

3-bit odd parity generator:

⊕ → X-OR

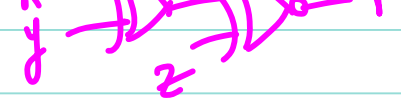
⊙

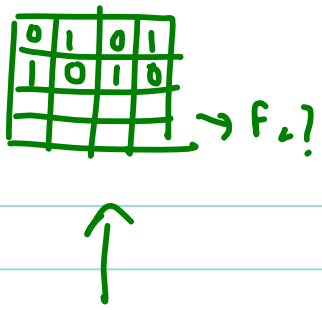
Message			Parity bit
x	y	z	P
0	0	0	1
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	0

x \ yz	00	01	11	10
0	1	0	1	0
1	0	1	0	1

$P = x \oplus y \odot z$ ✓

$P = x \odot y \oplus z$





Parity checker

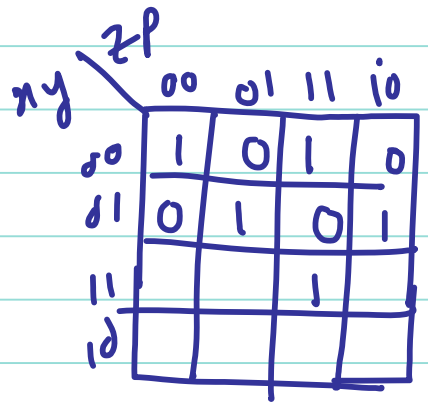
Sender → odd parity.

Recived signal x y z p	Parity - error E
0 0 0 0	1
0 0 0 1	0
0 0 1 0	0
0 0 1 1	1
0 1 0 0	0
0 1 0 1	1
0 1 1 0	1
0 1 1 1	0
1 0 0 0	0
1 0 0 1	1
— — .	
— — .	
— .	
1 1 1 1	1

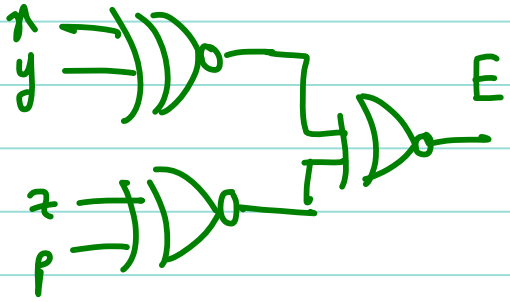
4-bit parity checker

↓

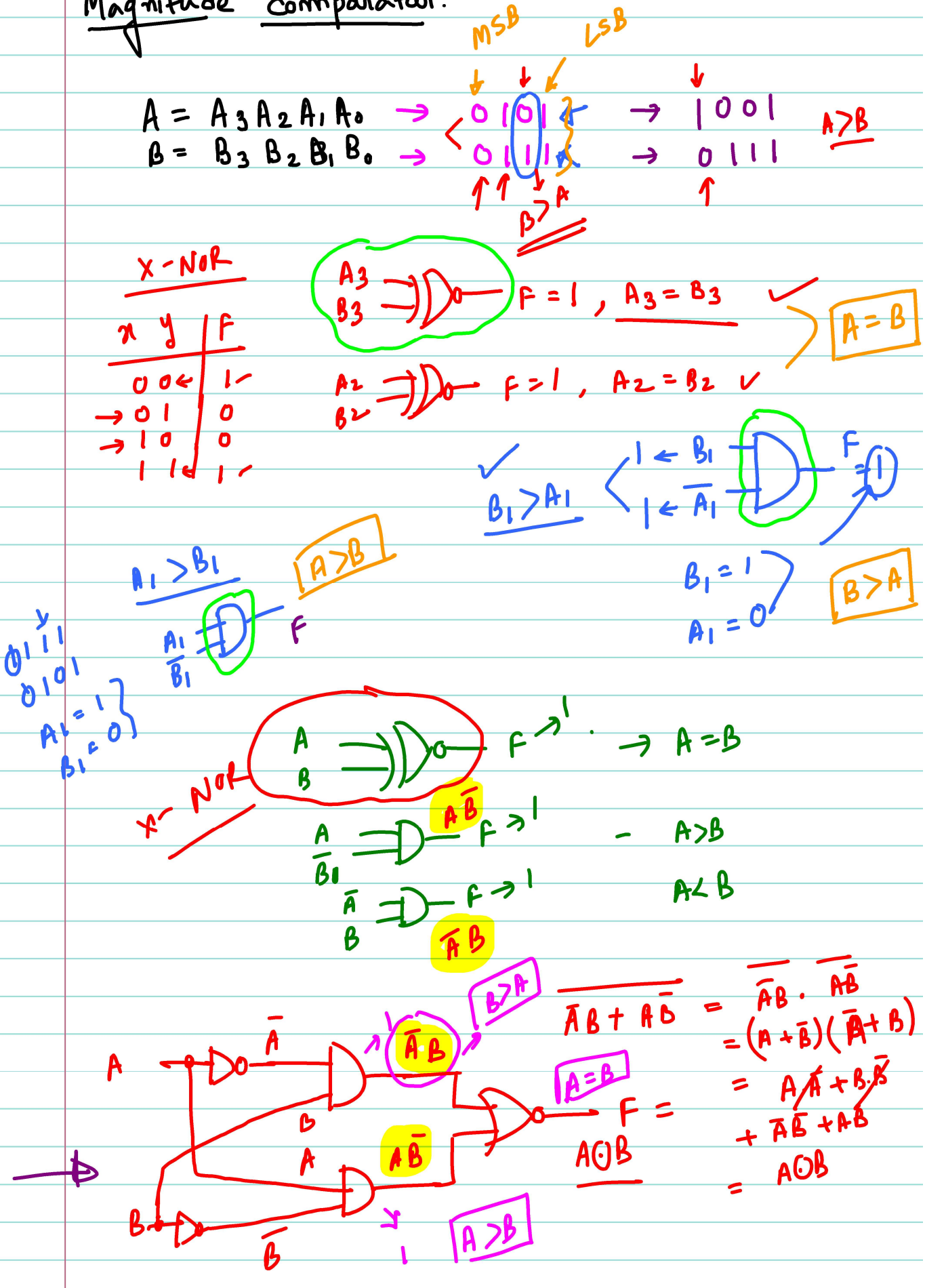
Message containing 3-bit

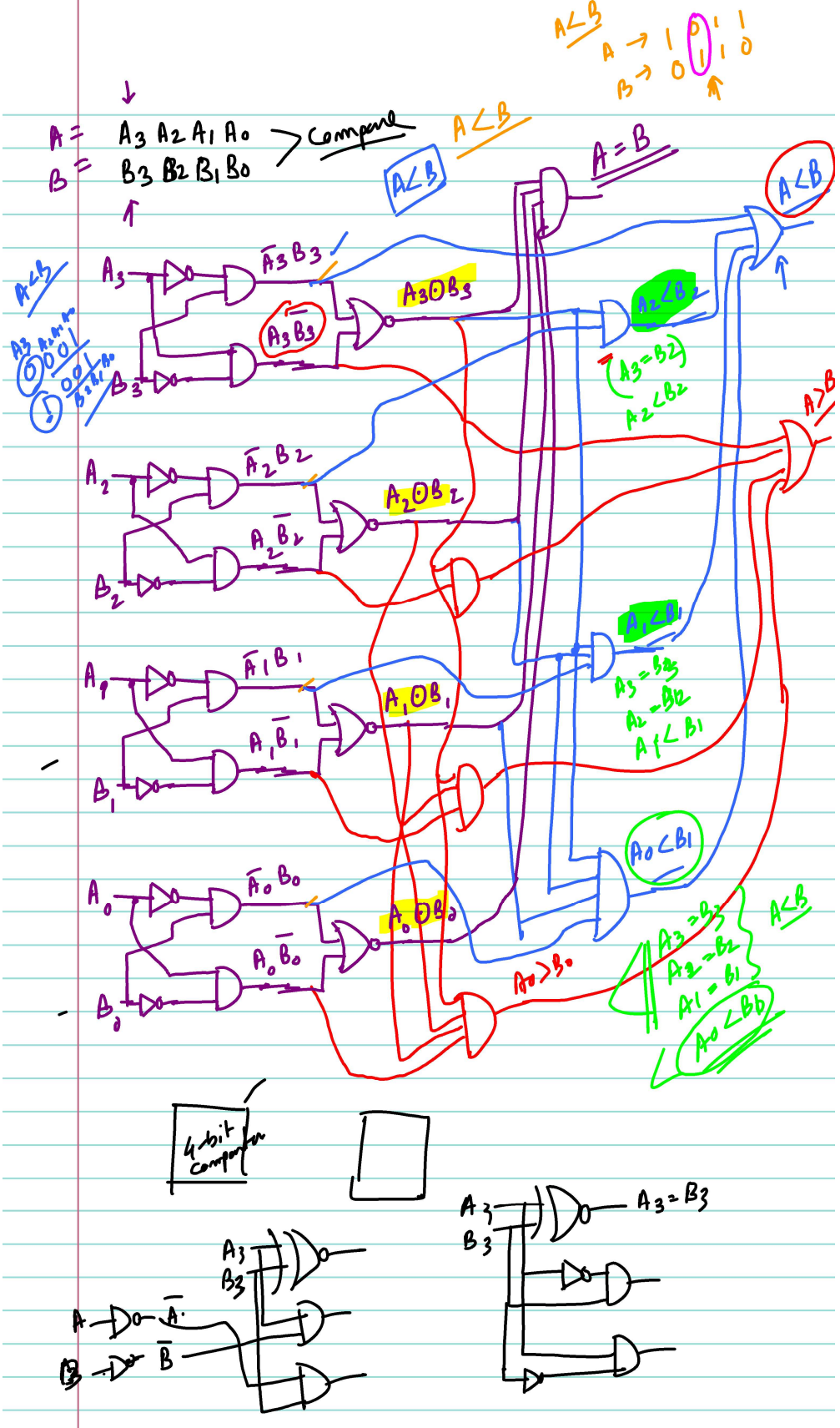


$E = x \odot y \odot z \odot p$



Magnitude comparator:

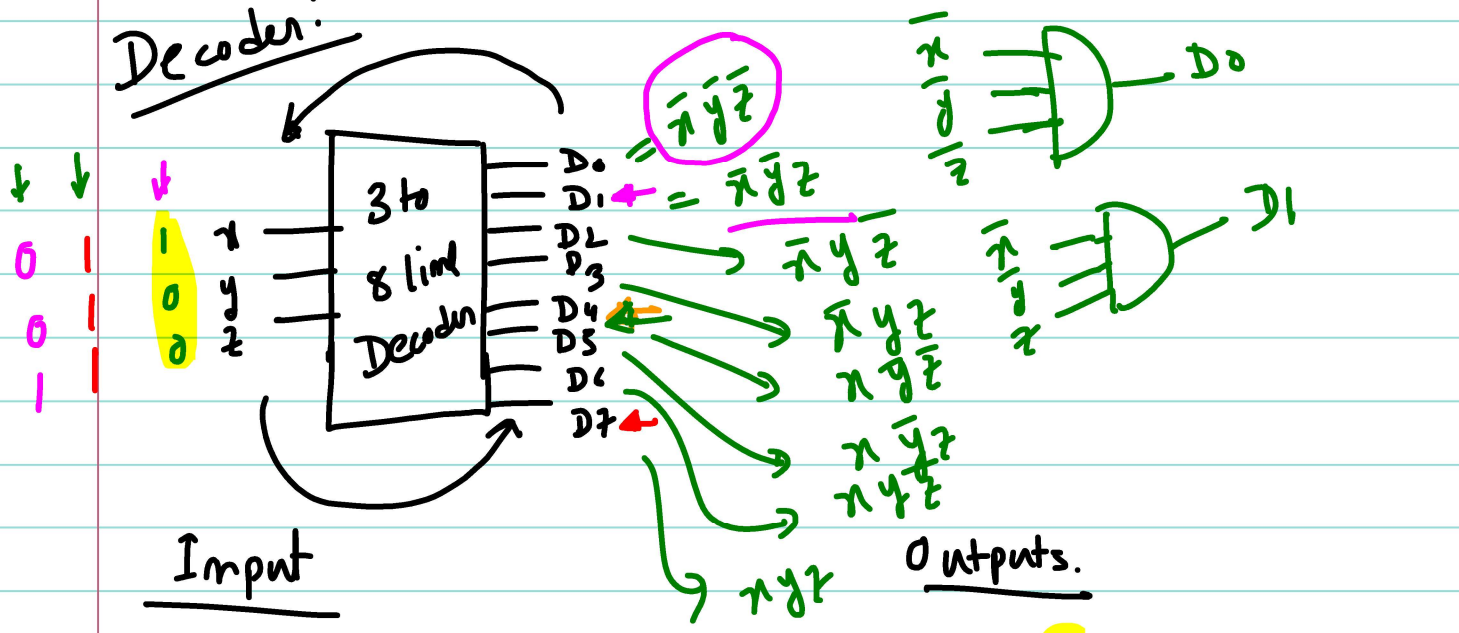



A = A3 A2 A1 A0
B = B3 B2 B1 B0
Compare
A<B
A=B
A3
B3
A3⊙B3
A2
B2
A2⊙B2
A1
B1
A1⊙B1
A0
B0
A0⊙B0
A0>B0
A3=B3
A2=B2
A1=B1
A0<B0
4 bit comparator

A
B
A3
B3

A3
B3
A3=B3

Decoder:



Input

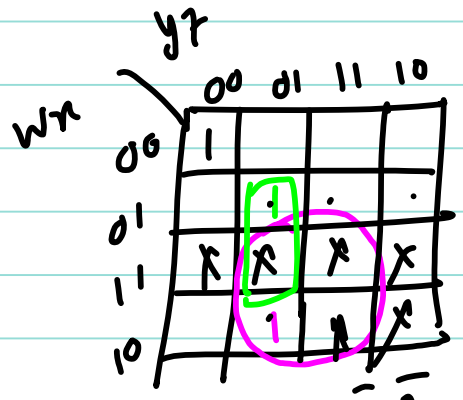
Outputs.

x	y	z	D0	D1	D2	D3	D4	D5	D6	D7
0	0	0	1	0	0	0	0	0	0	0
0	0	1	0	1	0	0	0	0	0	0
0	1	0			1					
0	1	1				1				
1	0	0					1			
1	0	1						1		
1	1	0							1	
1	1	1								1

Design BCD to decimal decoder:

BCD (i/p) — o/p's.

	W	x	y	z	D_0	D_1	D_2	D_3	D_4	D_5	D_6	D_7	D_8	D_9
Valid.	0	0	0	0	1									
	0	0	0	1	0	1								
	—	—	.		0									
	—	—	.		0									
	1	0	0	1	0									
	1	0	1	0	X									
Do'nt exist's.	1	0	—	.	X									
	—	—	.		X									
D on't care	1	1	1	1	X									



$D_0 = \bar{w}\,\bar{x}\,\bar{y}\,\bar{z}$

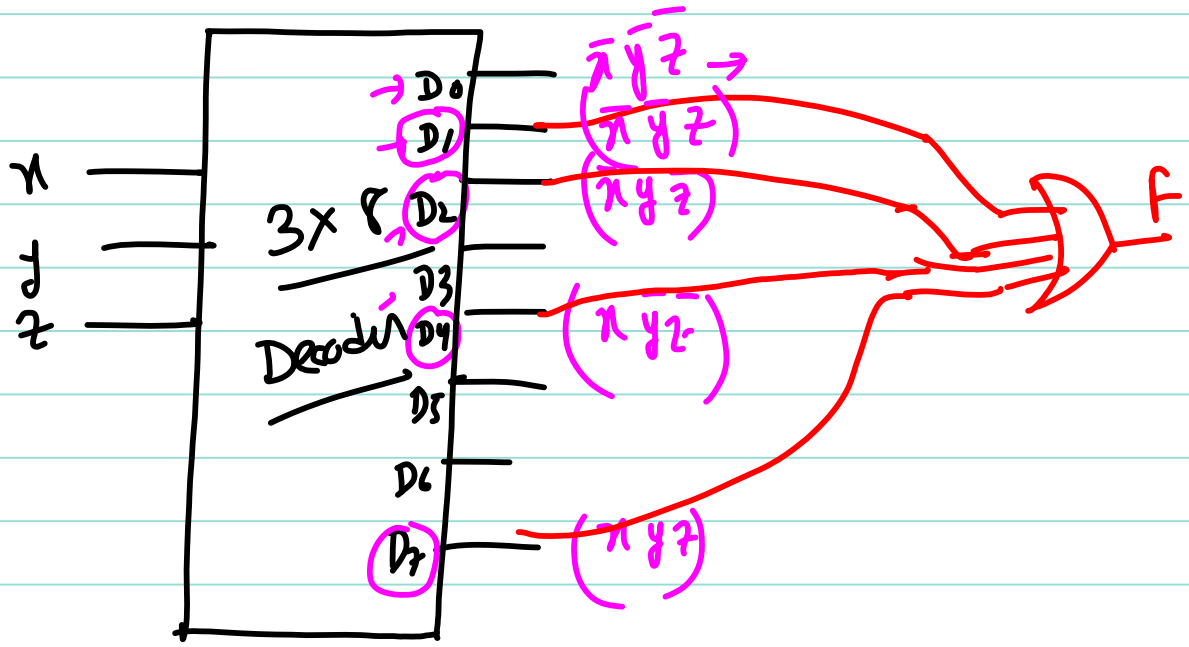
1

$D_9 = w\bar{x}\,\bar{y}\,\bar{z}$

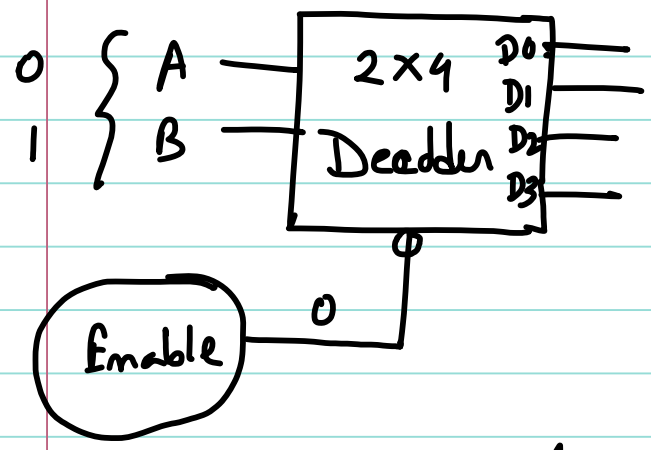
$D_9 = wz$

$\bar{x}\bar{y}\bar{z}$

Ex Implement $F(x,y,z) = \sum(1,2,4,7)$ using a 3 x 8 decoder.

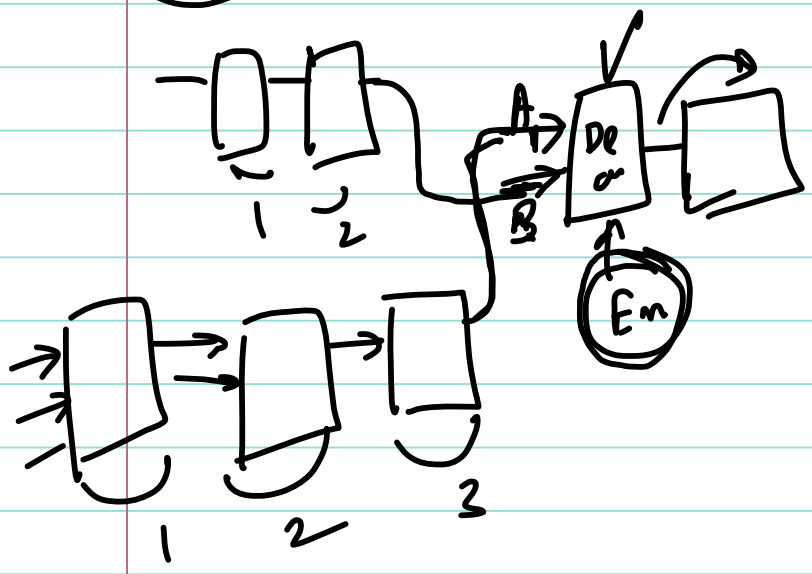


Decoder with Enable input:

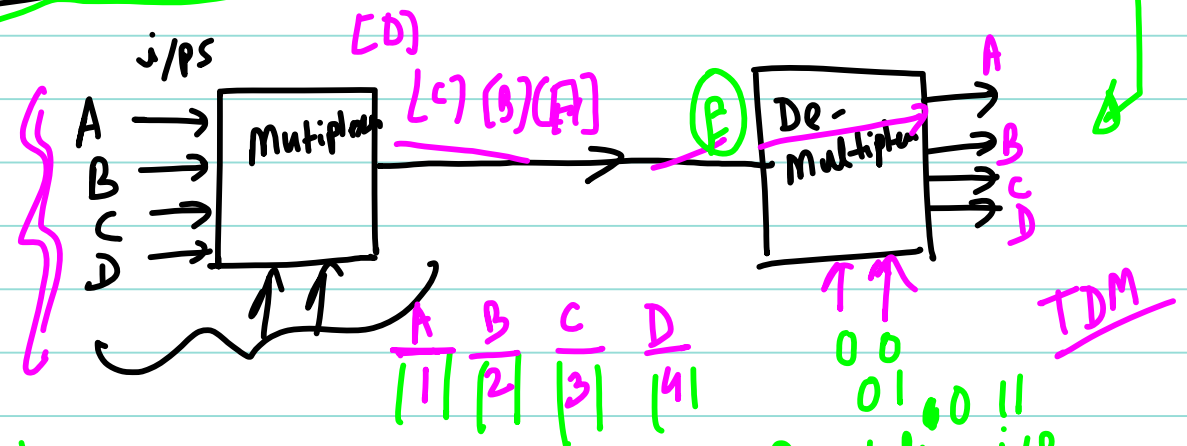


Truth

E	A	B	D_0	D_1	D_2	D_3
0	0	0	1	0	0	0
0	0	1	0	1	0	0
0	1	0	0	0	1	0
0	1	1	0	0	0	1
1	X	X	0	0	0	0



Demultiplexer:



Using Decoder with Enable i/p