EGC220
Class Notes
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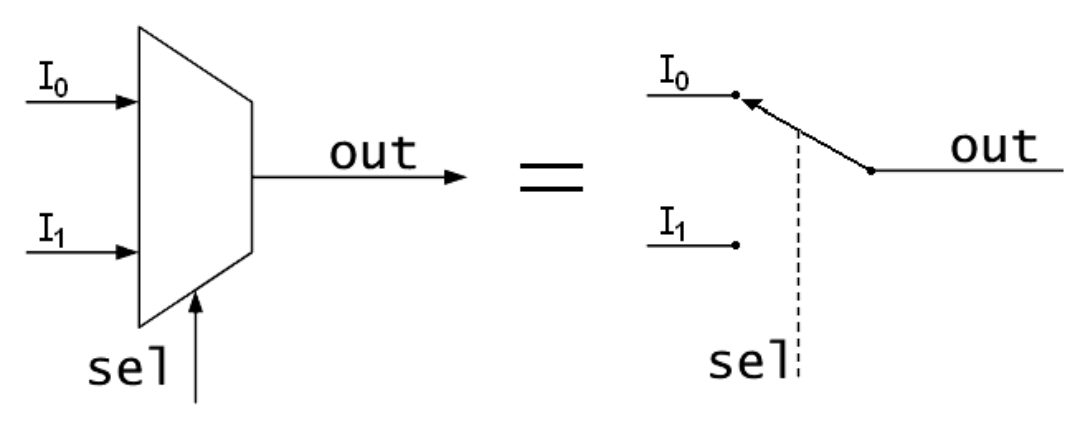
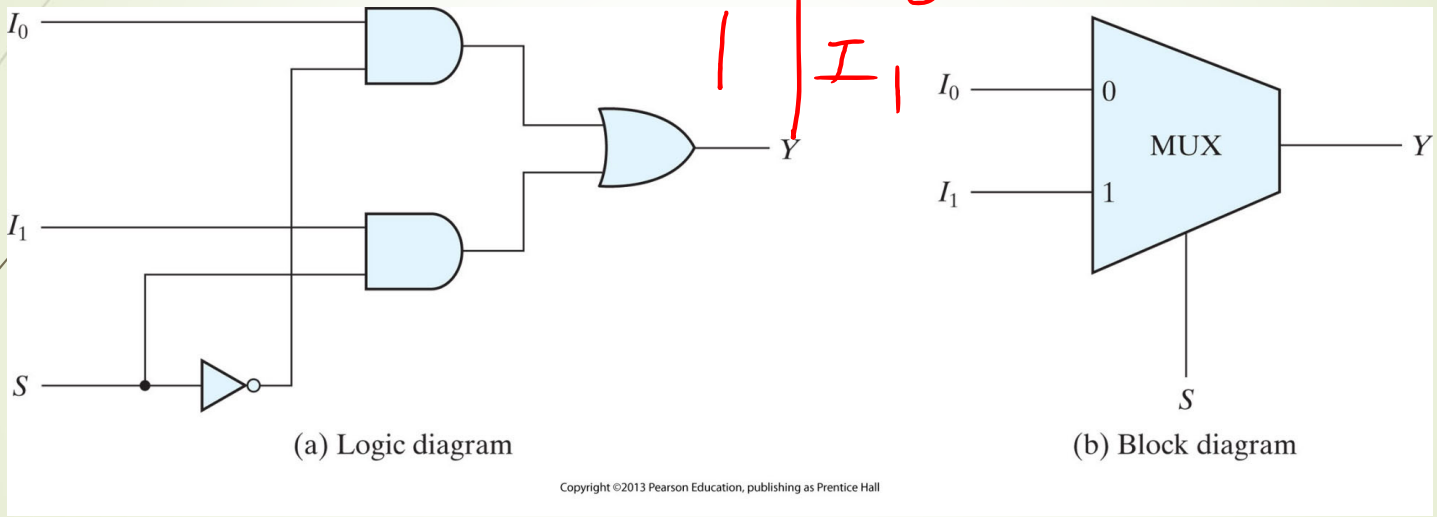
Two-to-one-line multiplexer



Two-to-one-line multiplexer

S	Y
0	I_0
1	I_1

$Y = \bar{S} I_0 + S I_1$

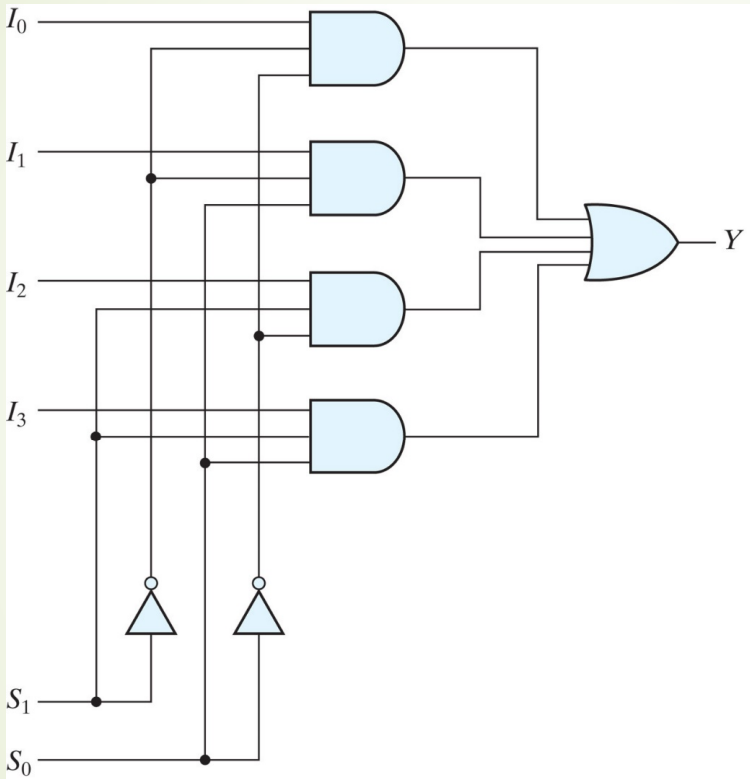


4x1 MUX

S_1	S_0	Z
0	0	I_0
0	1	I_1
1	0	I_2
1	1	I_3

$Z = \bar{S_1}\bar{S_0}I_0 + \bar{S_1}S_0I_1 + S_1\bar{S_0}I_2 + S_1S_0I_3$

Four-to-one-line multiplexer



(a) Logic diagram

S_1	S_0	Y
0	0	I_0
0	1	I_1
1	0	I_2
1	1	I_3

(b) Function table

Truth Table of an 8 × 3 Encoder

Table 4.7
Truth Table of an Octal-to-Binary Encoder

Inputs								Outputs		
D_0	D_1	D_2	D_3	D_4	D_5	D_6	D_7	x	y	z
1	0	0	0	0	0	0	0	0	0	0
0	1	0	0	0	0	0	0	0	0	1
0	0	1	0	0	0	0	0	0	1	0
0	0	0	1	0	0	0	0	0	1	1
0	0	0	0	1	0	0	0	1	0	0
0	0	0	0	0	1	0	0	1	0	1
0	0	0	0	0	0	1	0	1	1	0
0	0	0	0	0	0	0	1	1	1	1

Truth Table of a Priority Encoder

Table 4.8
Truth Table of a Priority Encoder

Inputs				Outputs		
D_0	D_1	D_2	D_3	x	y	V
0	0	0	0	X	X	0
1	0	0	0	0	0	1
X	1	0	0	0	1	1
X	X	1	0	1	0	1
X	X	X	1	1	1	1

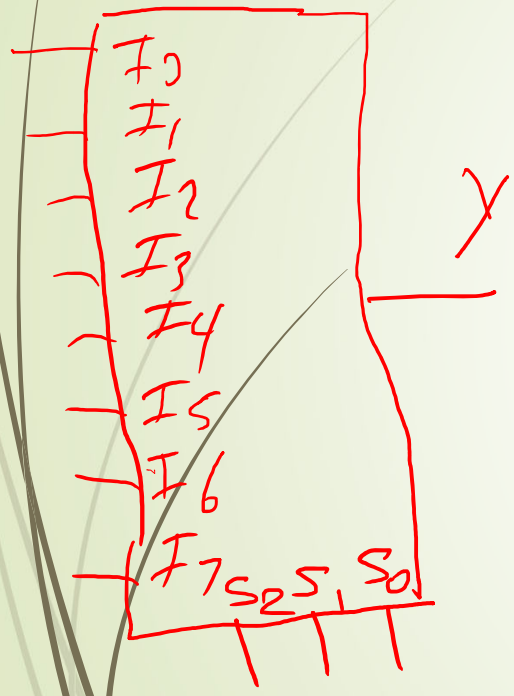
Problem 1

Obtain the truth table for an 8 × 3 priority encoder with inputs $D_0 - D_7$ and output X, Y, Z, V (valid).

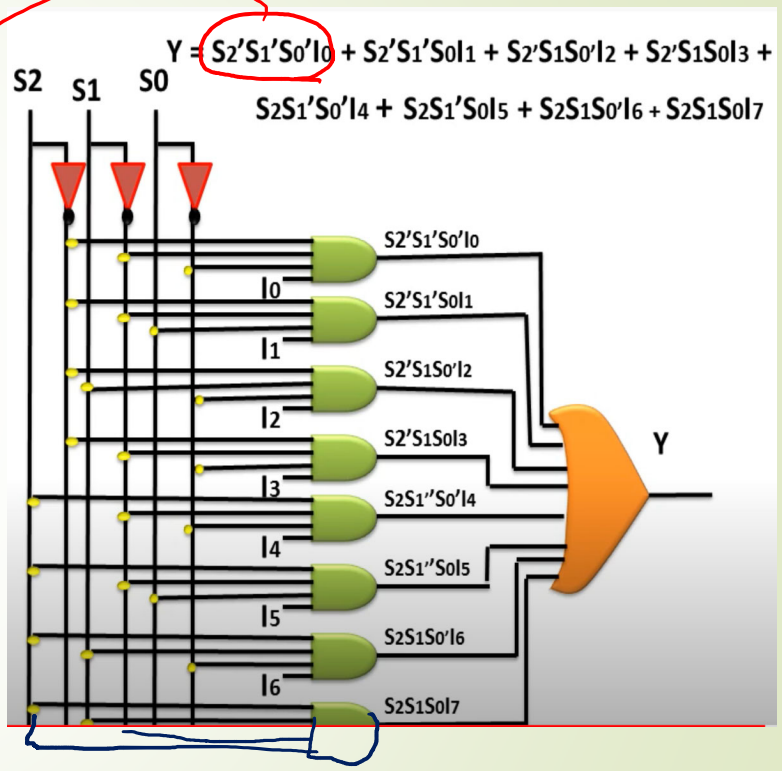
Problem 2

Design an 8 × 1 Mux.

$8 = 2^3$ → select

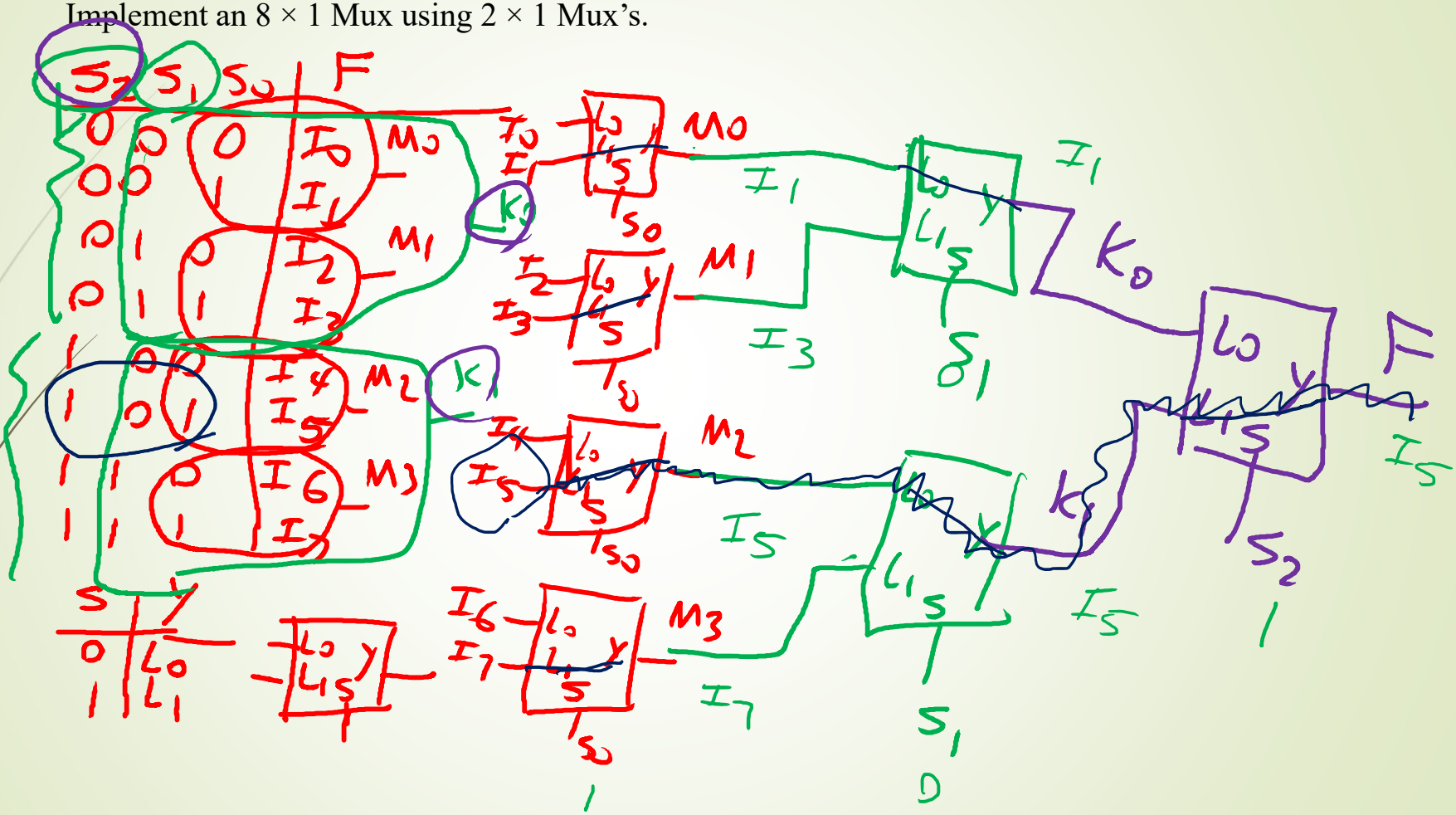


S_2	S_1	S_0	Y
0	0	0	I_0
0	0	1	I_1
0	1	0	I_2
0	1	1	I_3
1	0	0	I_4
1	0	1	I_5
1	1	0	I_6
1	1	1	I_7



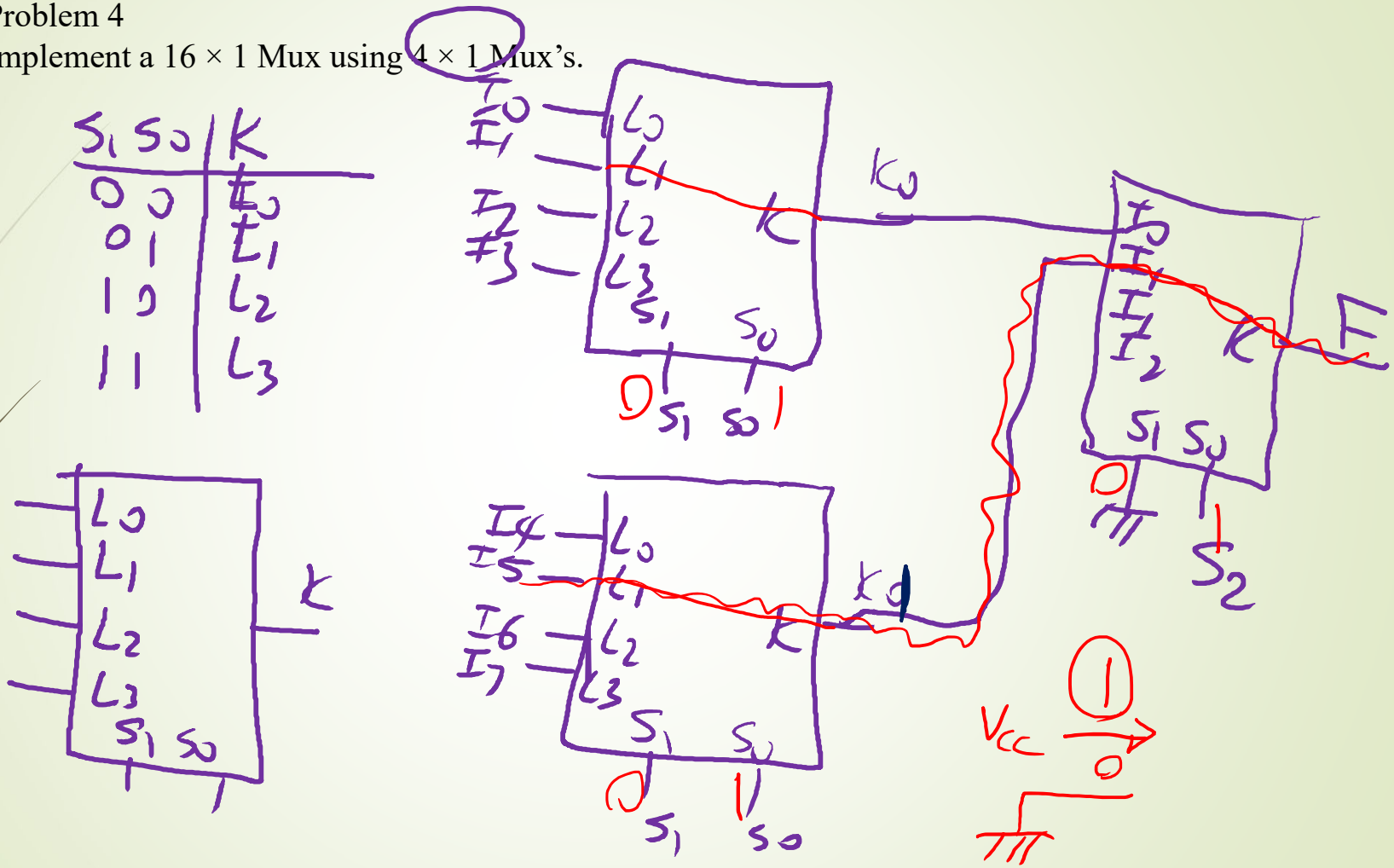
Problem 3

Implement an 8 × 1 Mux using 2 × 1 Mux's.



Problem 4

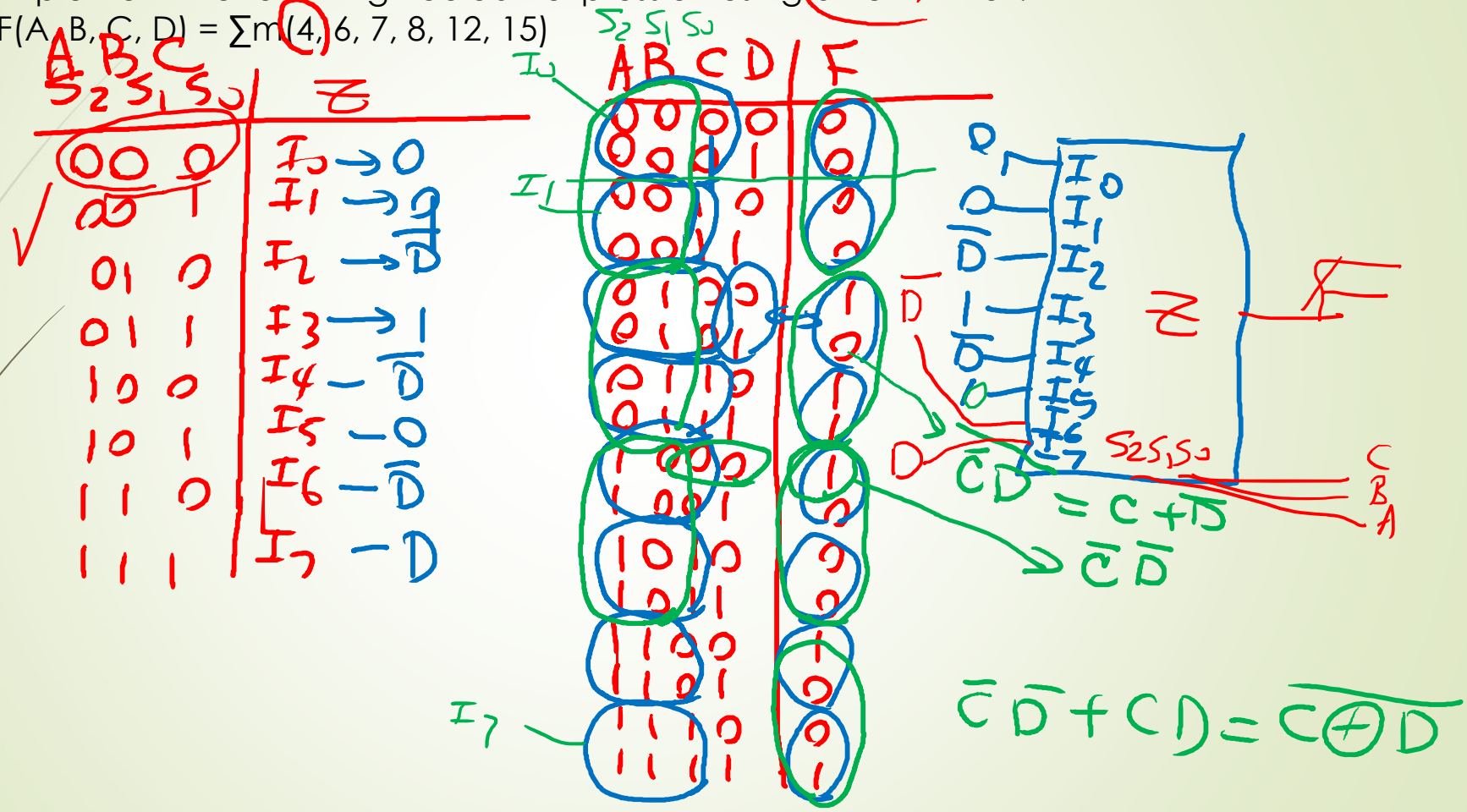
Implement a 16 × 1 Mux using 4 × 1 Mux's.



Problem 5

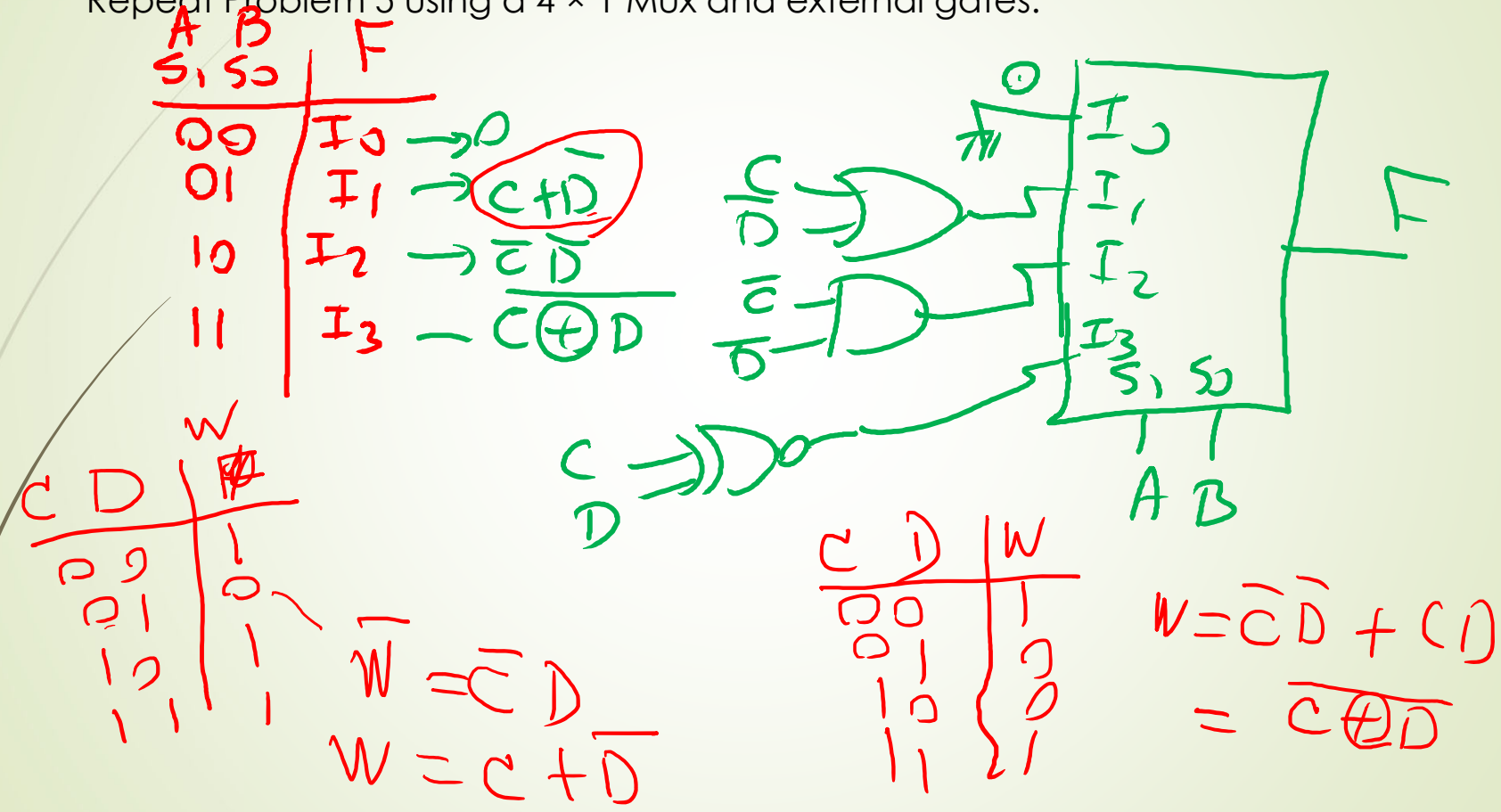
Implement the following Boolean expression using an 8 × 1 Mux.

$F(A, B, C, D) = \sum m(4, 6, 7, 8, 12, 15)$



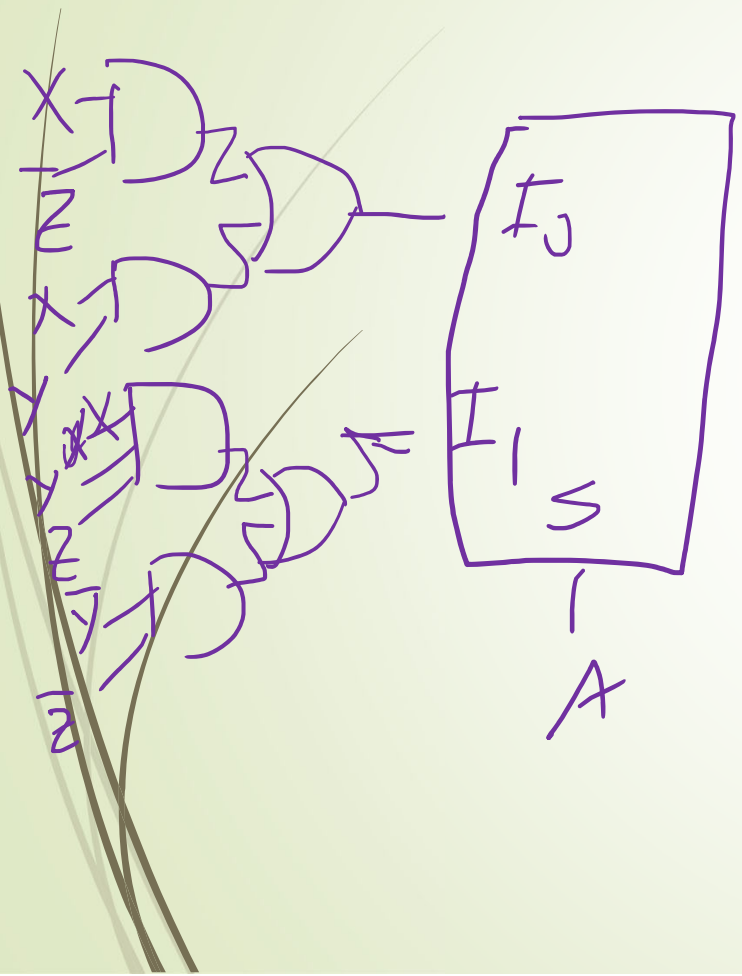
Problem 6

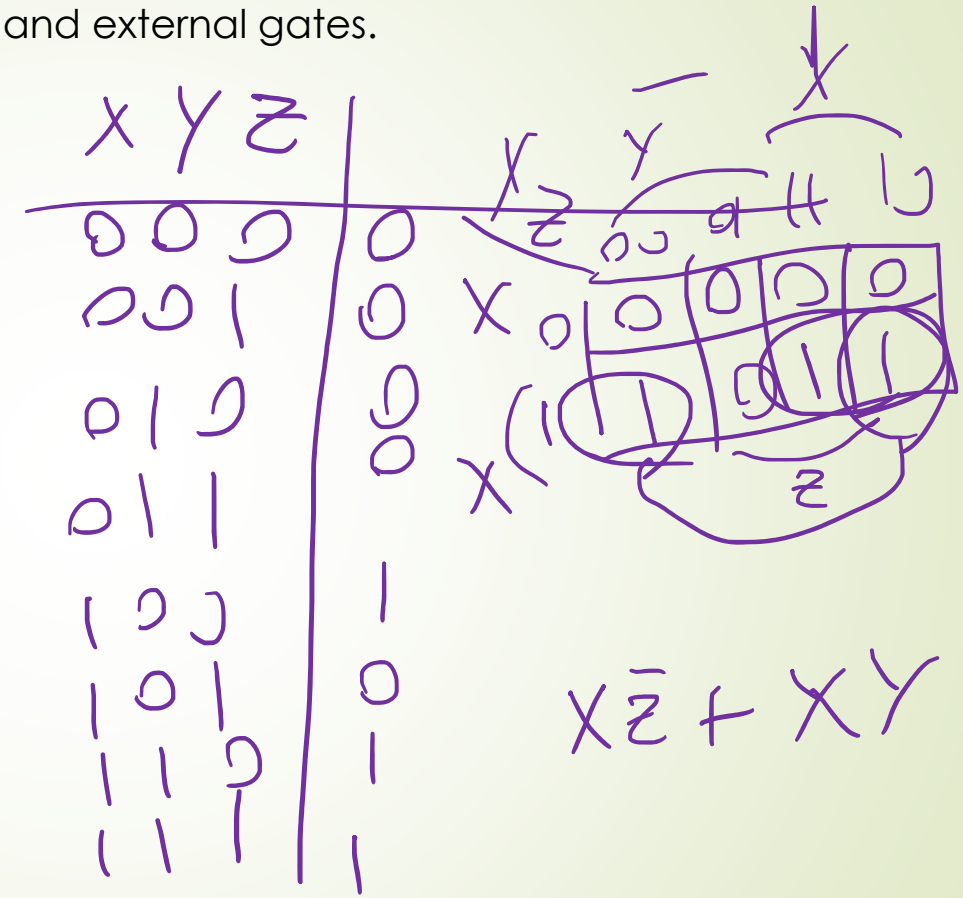
Repeat Problem 5 using a 4 × 1 Mux and external gates.



Problem 7

Repeat Problem 5 using a 2 × 1 Mux and external gates.





Problem 5

Implement the following Boolean expression using an 8 × 1 Mux.

$F(A, B, C, D) = \sum m(4, 6, 7, 8, 12, 15)$