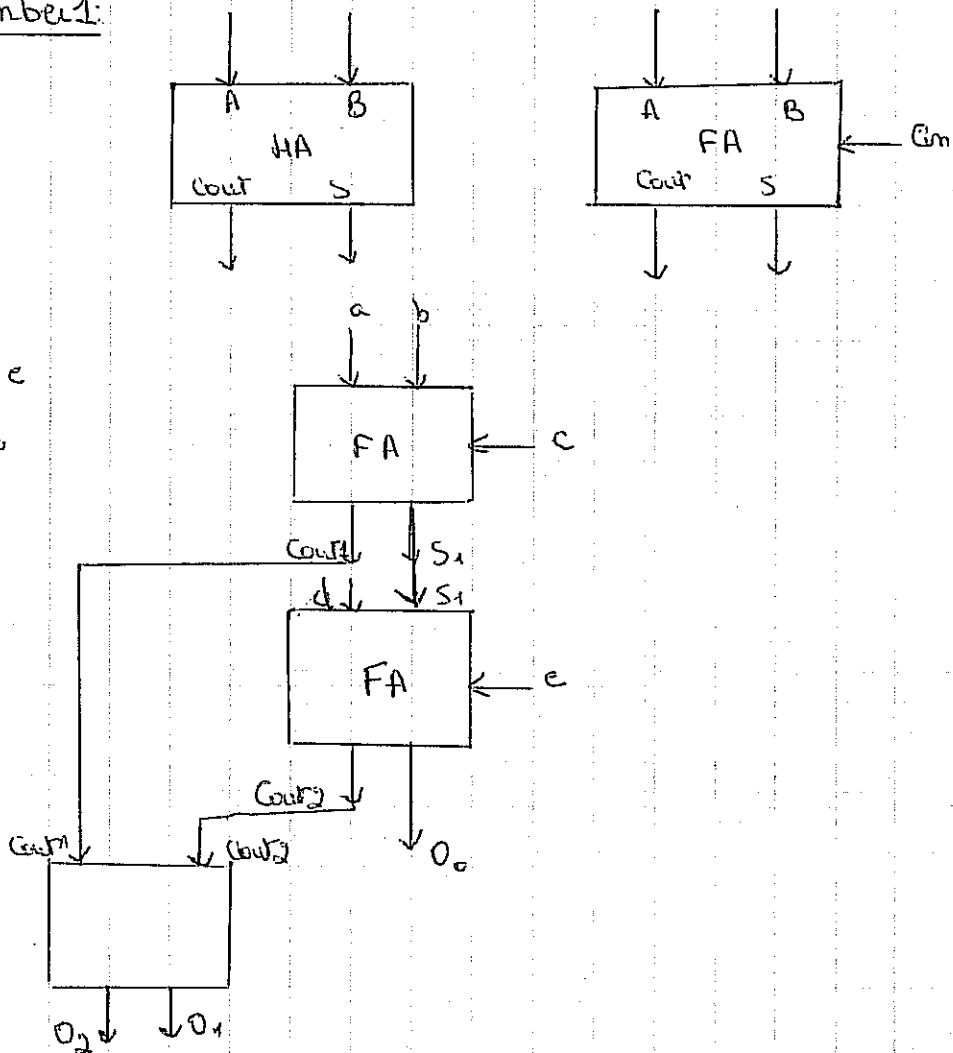


Assignment 6 - solution

number 1:

input: a, b, c, d, e
output: Q_3, Q_2, Q_1, Q_0



number 2

input: 2 bit number

output: 5x number

using 3-to-8 decoder + min number of additional gates
4 bit output:

A	B	Q_4	Q_3	Q_2	Q_1
0	0	0	0	0	0
0	1	0	1	0	1
1	0	1	0	1	0
1	1	1	1	1	1

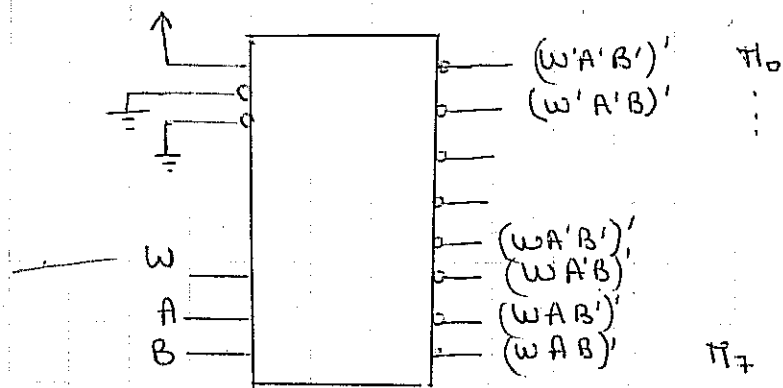
$$Q_4 = B$$

$$Q_3 = A$$

$$Q_2 = B$$

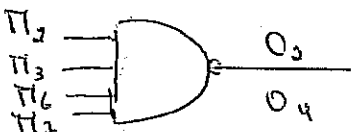
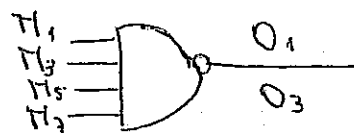
$$Q_1 = A$$

(any random variable)



$$O_1 = A'B + AB$$

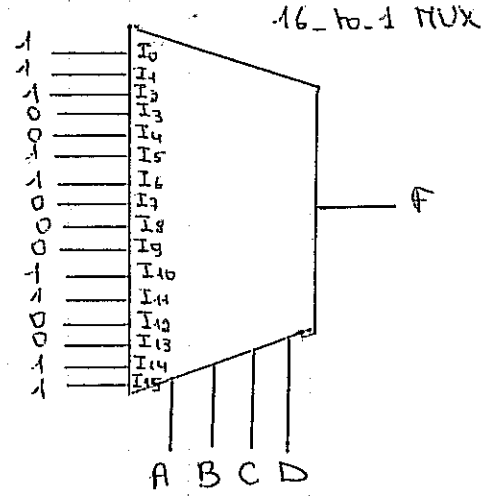
$$= W'A'B + WA'B + W'AB + WAB$$



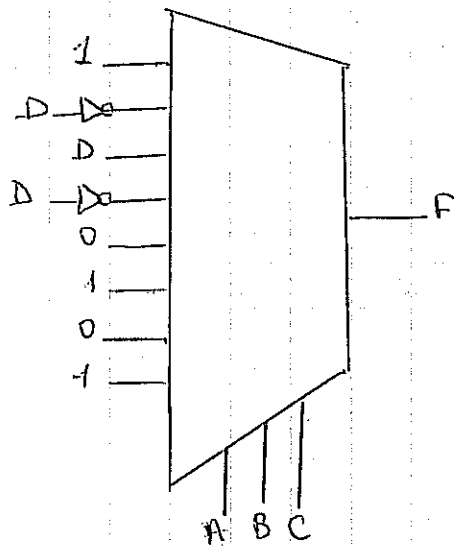
number 3

$$F = \sum_{A,B,C,D} (0, 1, 2, 5, 6, 10, 11, 14, 15)$$

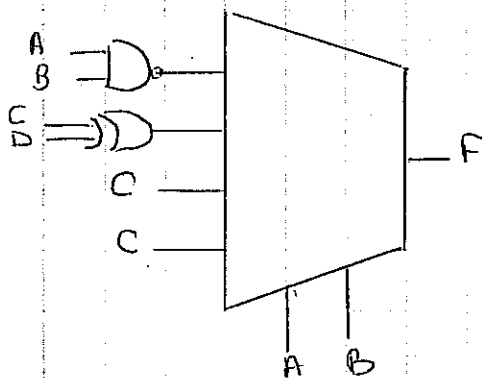
a) 16 to 1 MUX



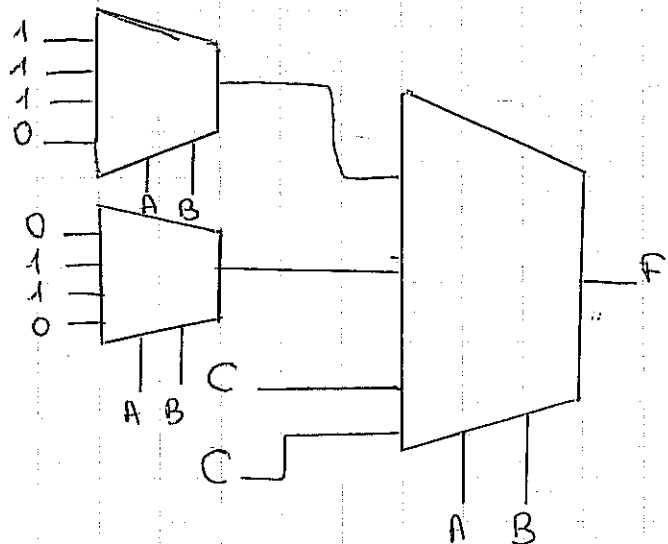
b) 8-1 MUX + inverter



c) 4-1 Mux + min gates



d) 4-1 Mux



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

Design a circuit that accepts a 3-bit number and generates an output = 5 * input.

using 74138 + additional gates

A	B	C	R_5	R_4	R_3	R_2	R_1	R_0
0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	1	0	1
0	1	0	0	0	1	0	1	0
0	1	1	0	0	1	1	1	1
1	0	0	0	1	0	1	0	0
1	0	1	0	1	1	0	0	1
1	1	0	0	1	1	1	1	0
1	1	1	1	0	0	0	1	1

