

ASSIGNMENT 9

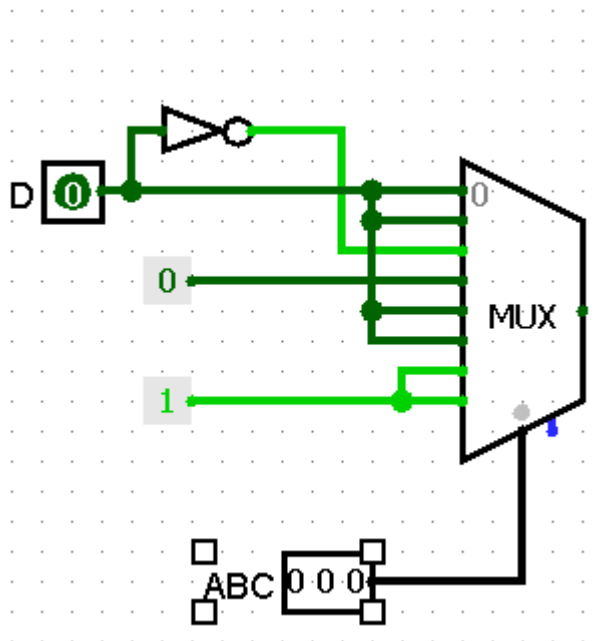
Jeremy Scheuerman

- 1) A combinational circuit is defined with following Boolean function.

$$F(A, B, C, D) = (\bar{A} + \bar{B} + D)(\bar{A} + \bar{D})(A + B + \bar{D})(A + \bar{B} + C + D)$$

Implement it only using a multiplexer and NOT gates.

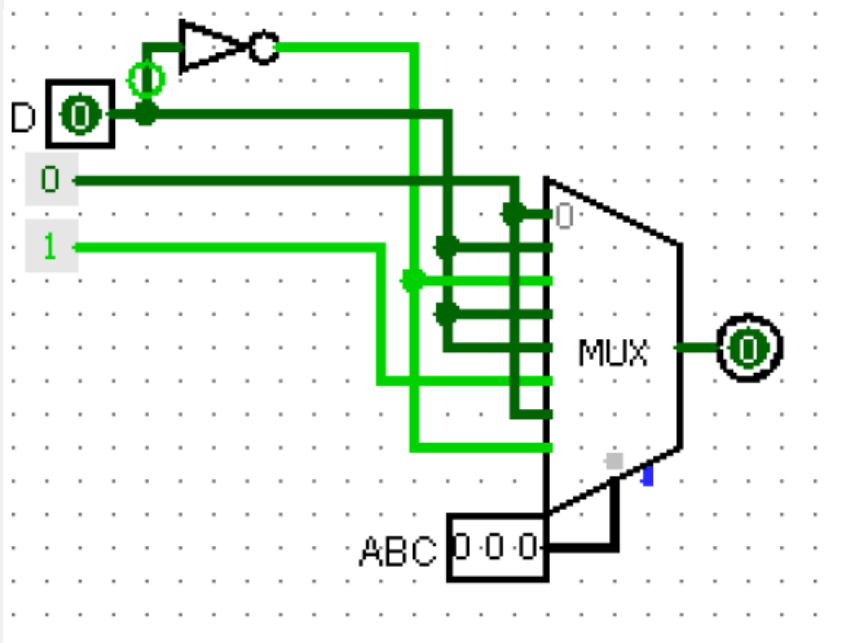
A	B	C	D	F
0	0	0	0	0
0	0	0	1	1
0	0	1	0	1
0	0	1	1	0
0	1	0	0	1
0	1	0	1	1
0	1	1	0	0
0	1	1	1	1
1	0	0	0	0
1	0	0	1	1
1	0	1	0	0
1	0	1	1	1
1	1	0	0	1
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1



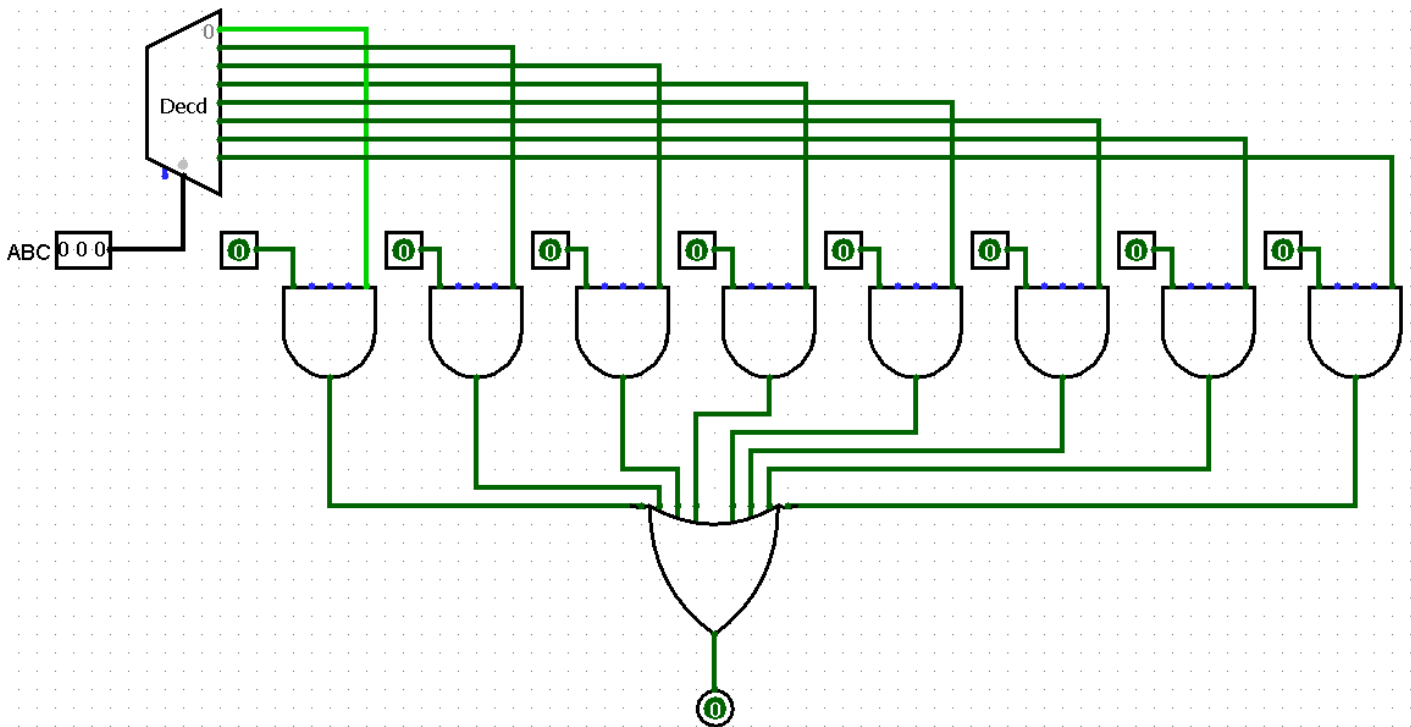
- 2) Implement the following Boolean function with a multiplexer and an inverter with variable D as its input.

$$F(A, B, C, D) = \sum m(2, 4, 6, 9, 10, 11, 15)$$

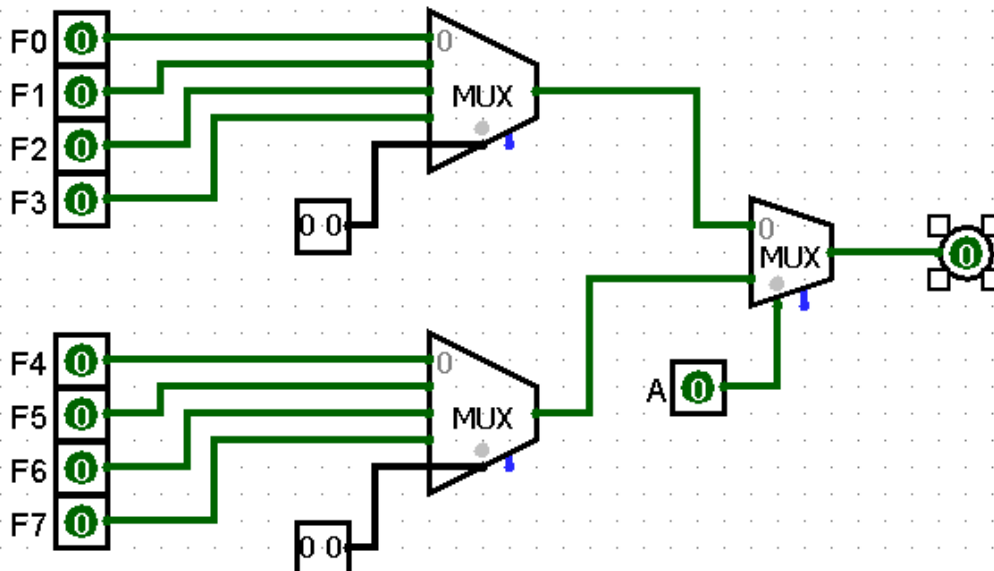
A	B	C	D	F
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	1
0	1	0	0	1
0	1	0	1	0
0	1	1	0	0
0	1	1	1	1
1	0	0	0	0
1	0	0	1	1
1	0	1	0	1
1	0	1	1	1
1	1	0	0	0
1	1	0	1	0
1	1	1	0	1
1	1	1	1	0



- 3) Design an 8-to-1-line multiplexer using a 3-to-8 line decoder and eight 2 input AND gate and an 8 input OR gate.



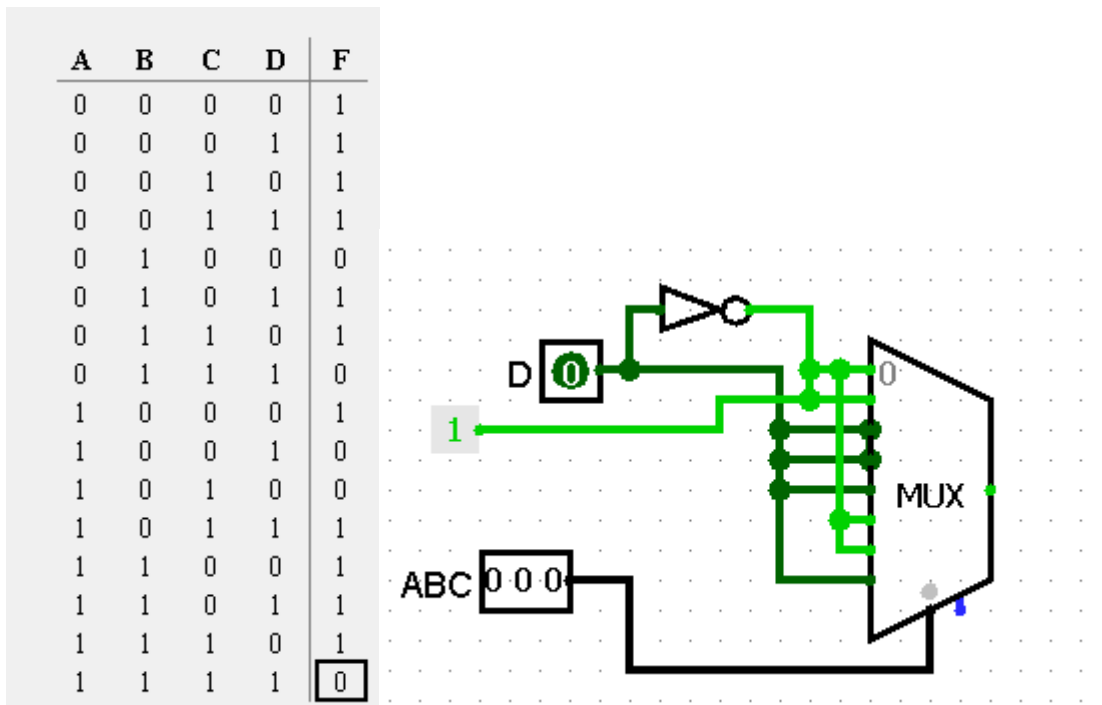
- 4) Design an 8-to-1-line multiplexer using two 4-to-1 line multiplexer and one 2-to-one line multiplexer.



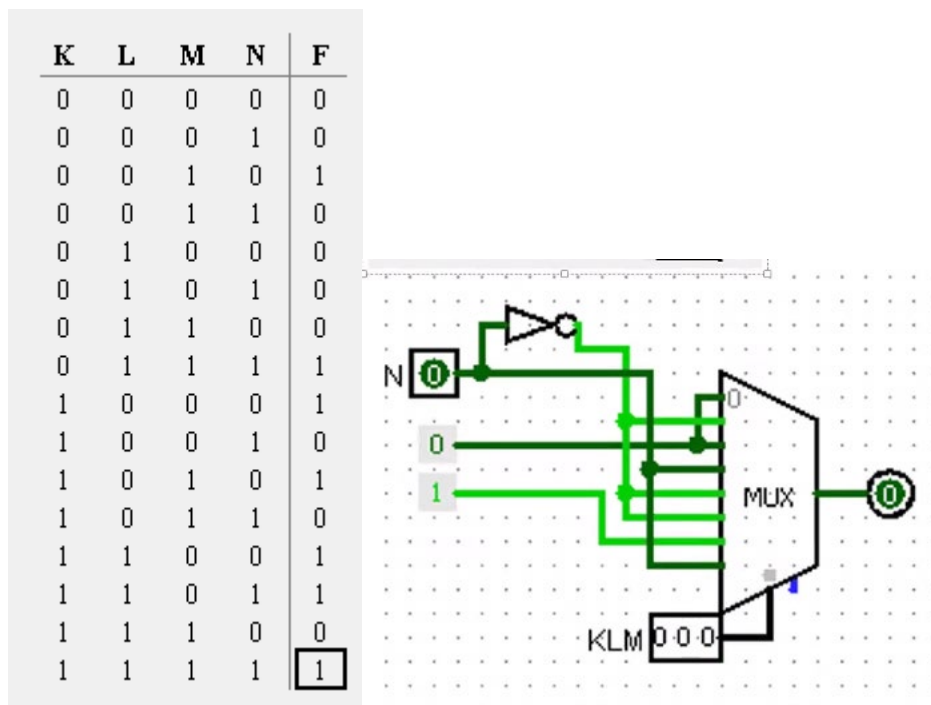
- 5) Design multiplexer implementations for the following functions

$$Z = f(A,B,C,D) = \Sigma(0,1,2,3,5,7,8,10,12,13,15)$$

a.



b. $Z = f(K,L,M,N) = K\bar{L}\bar{N} + KLM\bar{N} + LMN + \bar{K}\bar{L}M\bar{N}$



c. $Z = f(A,B,C,D) = \bar{A}\bar{C}\bar{D} + B\bar{C}\bar{D} + A\bar{B}\bar{C} + \bar{A}B\bar{C}D + \bar{A}B\bar{C}\bar{D}$

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

