

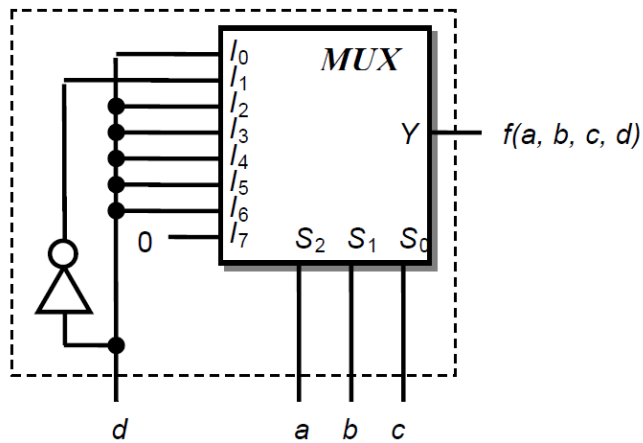
EE 2000 Logic Circuit Design
Semester A 2024/25

Tutorial 6

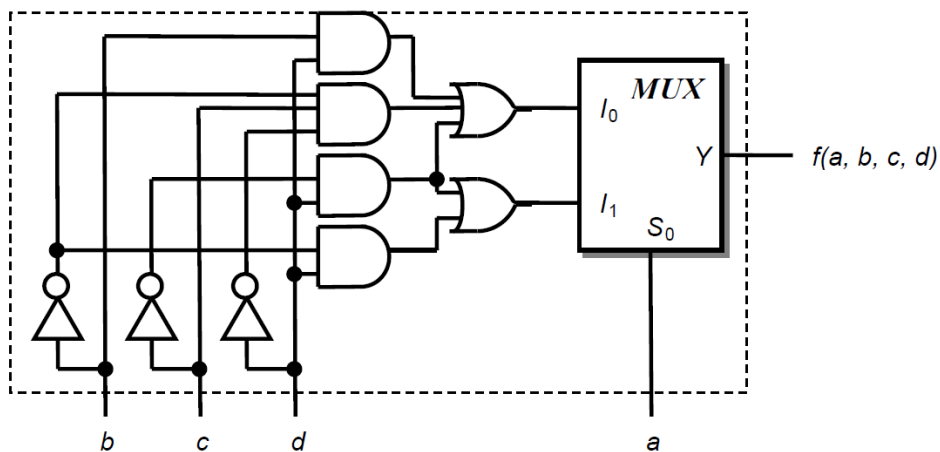
1. Implement the function $f(a, b, c, d) = \sum m(1, 2, 5, 7, 9, 11, 13)$ using:
 - (a) A 8-to-1-line multiplexer and a NOT gate only
 - (b) A 2-to-1-line multiplexer and minimum number of AND, OR, NOT gates

(Hints: Assign variable a as selection input of the MUX, and then express f as a function of b, c, d with the help of K-map)

Answer (a) :



Answer (b) :



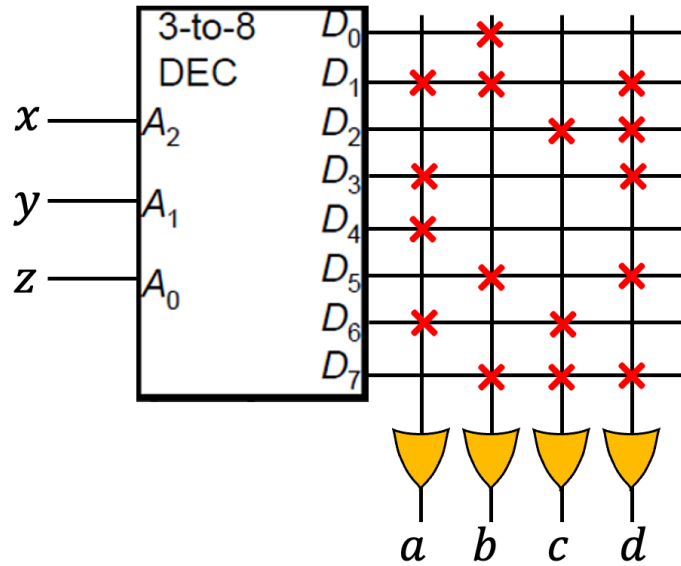
2. Construct an 8×4 PROM using a 3-to-8 decoder for the following functions.

$$A(x,y,z) = \Sigma m(1,3,4,6)$$

$$B(x,y,z) = \Sigma m(0,1,5,7)$$

$$C(x,y,z) = \Sigma m(2,6,7)$$

$$D(x,y,z) = \Sigma m(1,2,3,5,7)$$



3. Construct the PLA diagram with the least number of distinct product terms for the following functions.

$$A(x,y,z) = \Sigma m(1,2,4,6)$$

$$B(x,y,z) = \Sigma m(0,1,6,7)$$

$$C(x,y,z) = \Sigma m(2,6)$$

$$D(x,y,z) = \Sigma m(1,2,3,5,7)$$

Find all complements for functions A , B , C , D .

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

$$A = xz' + yz' + x'y'z$$

$$A' = xz + yz + x'y'z'$$

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

$$B = xy + x'y'$$

$$B' = xy' + x'y$$

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

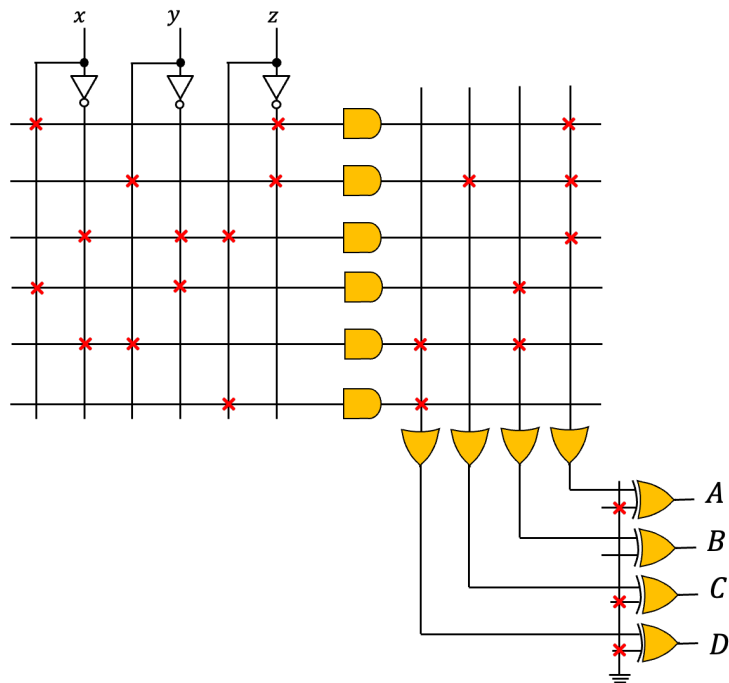
$$C = yz'$$

$$C' = y' + z$$

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

$$D = x'y + z$$

$$D' = xz' + y'z'$$



4. Given the following PAL, construct the PAL diagram for the following functions.

$$\begin{aligned}
 x(a, b, c, d) &= \Sigma m(2, 12, 13) \\
 y(a, b, c, d) &= \Sigma m(0, 2, 3, 4, 5, 6, 7, 8, 10, 11, 15) \\
 z(a, b, c, d) &= \Sigma m(1, 2, 8, 12, 13)
 \end{aligned}$$

$$\begin{aligned}
 x(a, b, c, d) &= a'b'cd' + abc' \\
 y(a, b, c, d) &= b'd' + a'b + cd \\
 z(a, b, c, d) &= a'b'c'd + a'b'cd' + abc' + ac'd' \\
 &= a'b'c'd + x + ac'd'
 \end{aligned}$$

