EE 200- Digital Logic Circuit Design
3.4 Product-of-Sums Simplification
3.5 Don't-Care Conditions

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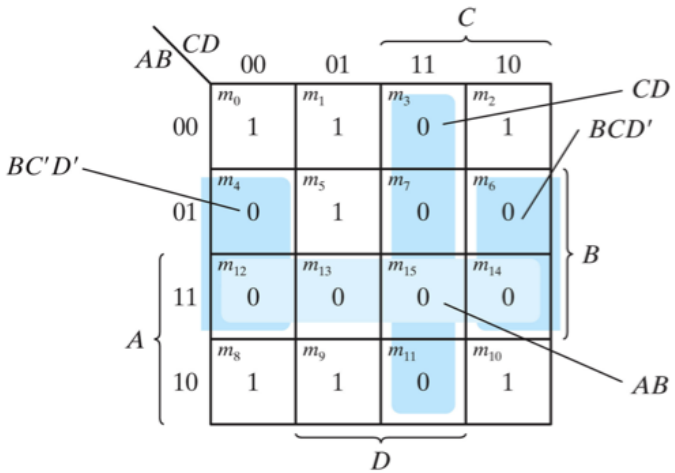
Introduction

- Can you give an example of don't-care condition

Lecture Outline

Product-of-Sums Simplification

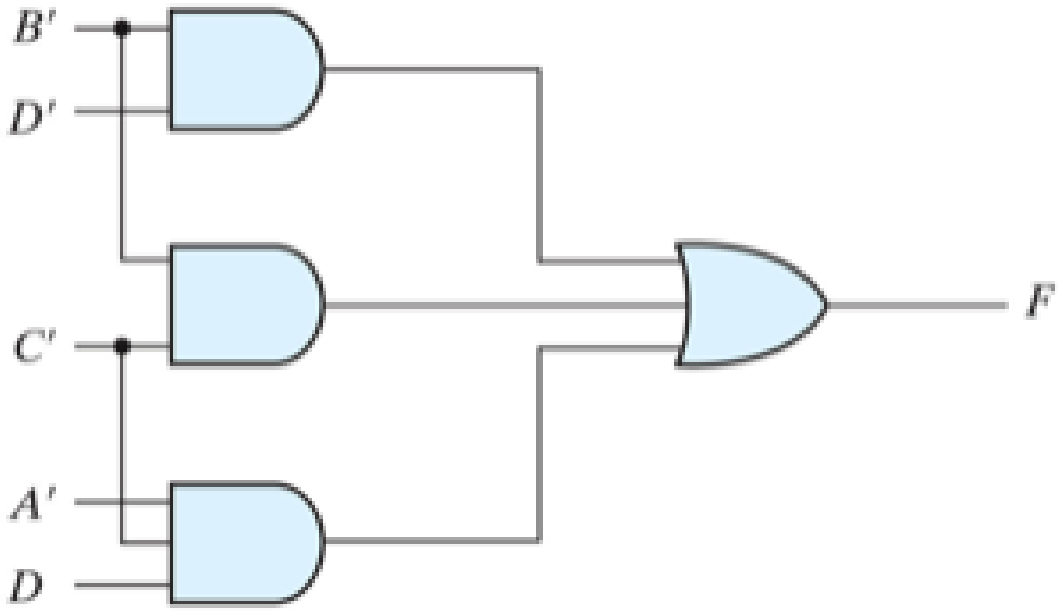
- $F(A, B, C, D) = \sum(0, 1, 2, 5, 8, 9, 10)$
- $F = B'D' + B'C' + A'C'D$



- $F' = AB + CD + BD'$
- Using DeMorgan's $F = (A' + B')(C' + D')(B' + D)$

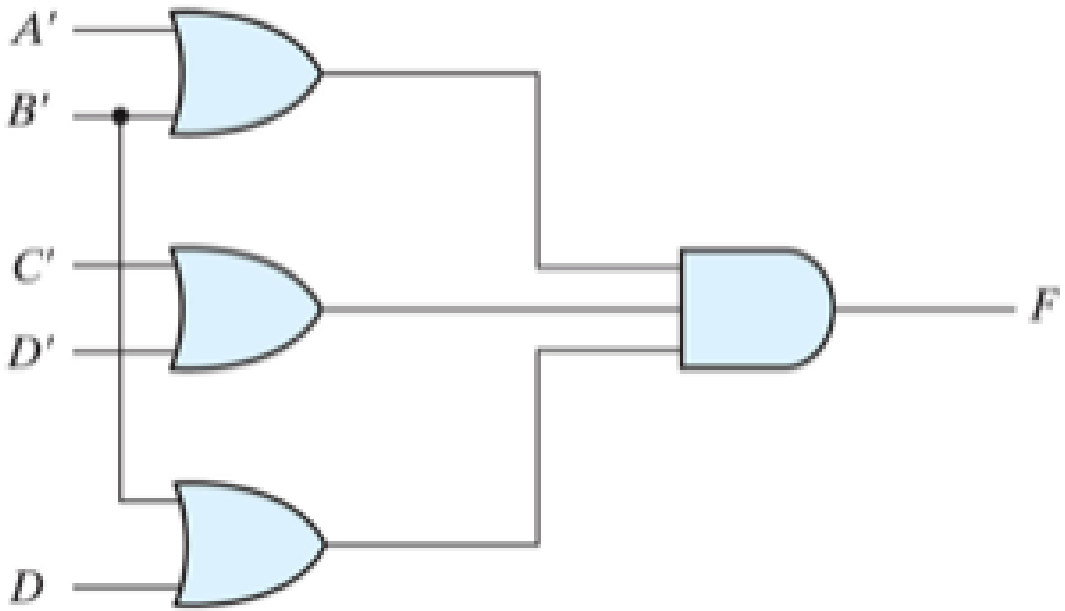
Product-of-Sums Simplification

- $F = B'D' + B'C' + A'C'D$



Product-of-Sums Simplification

- $F = (A' + B')(C' + D')(B' + D)$

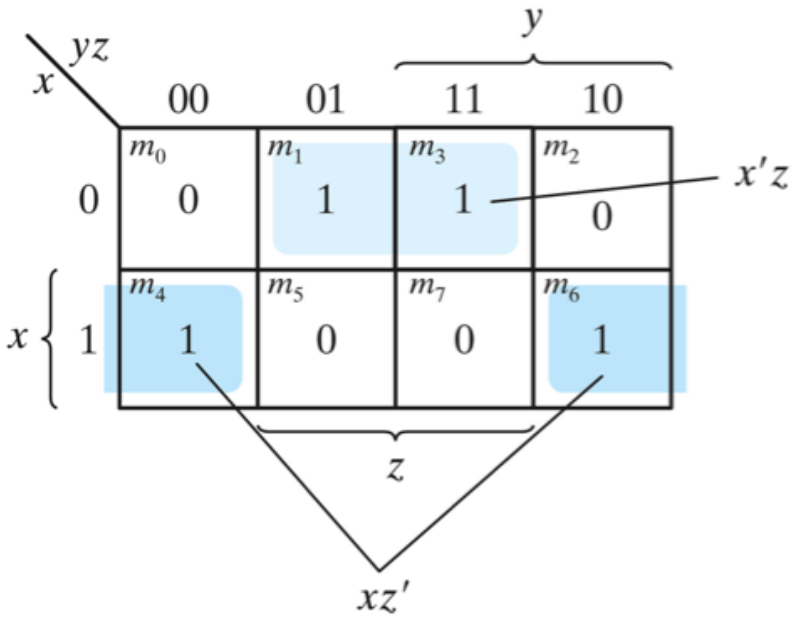


Product-of-Sums Simplification

x	y	z	F
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	0

- $F = m_1 + m_3 + m_4 + m_6$

Product-of-Sums Simplification



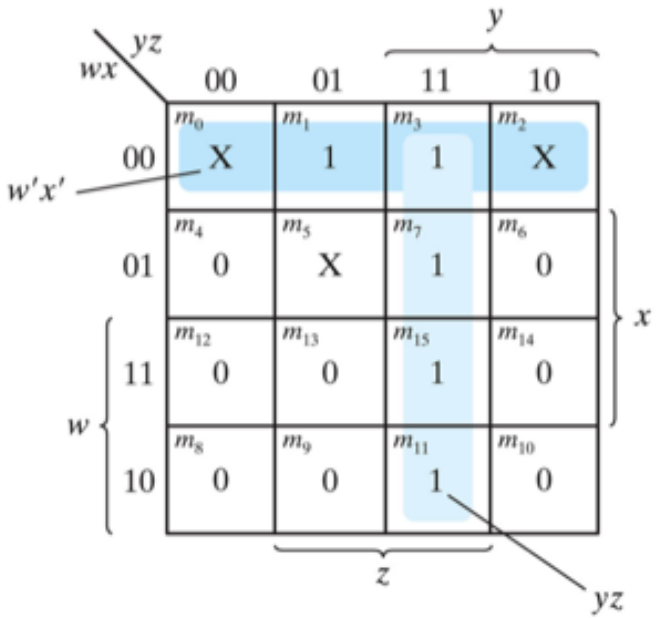
- $F = x'z + xz'$
- $F' = xz + x'z'$
- $(F')' = F = (x' + z')(x + z)$

Product-of-Sums Simplification

- What if the function was given as product of maxterms?
- $F = (A' + B' + C')(B + D)$
- $F' = ABC + B'D'$
- Mark F' minterms' squares with 0's and the remaining squares with 1's.

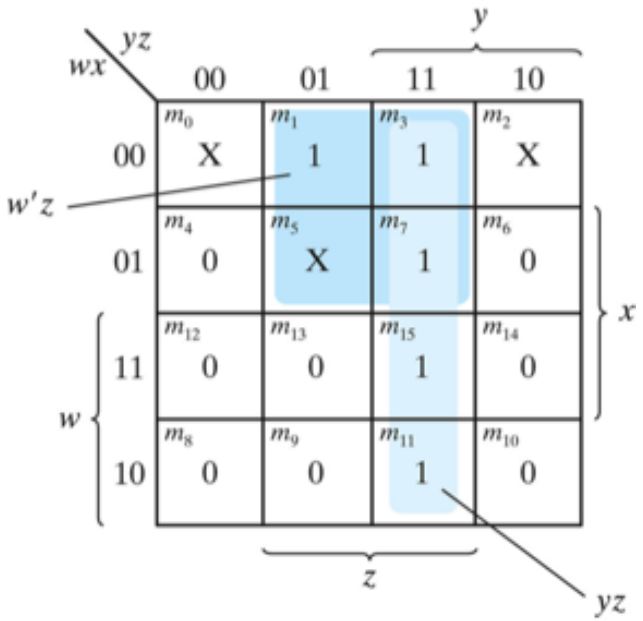
Don't-Care Conditions

- Simplify $F(w, x, y, z) = \sum(1, 3, 7, 11, 15)$ with don't-care conditions $d(w, x, y, z) = \sum(0, 2, 5)$



- $F = yz + w'x'$

Don't-Care Conditions



- $F = yz + w'z$

Summary

Next Lecture

- NAND and NOR Implementation.