

# EE 200- Digital Logic Circuit Design

## 3.2 Karnaugh Maps (K-Map)

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# Introduction

- Using Boolean functions' algebraic manipulation methods, can one **always** guarantee to get the simplest form?
- What is the simplest algebraic form of a Boolean functions?



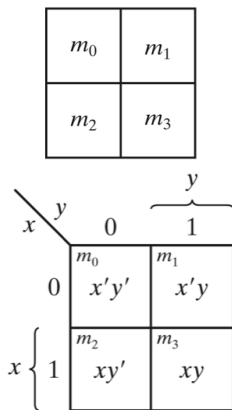
# Lecture Outline

- 1 The Map Method
  - Two-Variable K-Map
  - Three-Variable K-Map



# Two-Variable K-Map

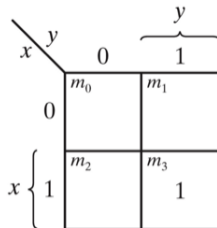
- A K-Map is a graphical representation of a logic function's truth table.





# Two-Variable K-Map

x	y	f
0	0	0
0	1	0
1	0	0
1	1	1



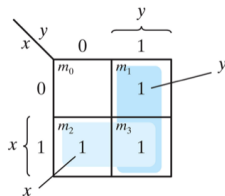
- $f = xy$



# Two-Variable K-Map

- $f = m_1 + m_2 + m_3$

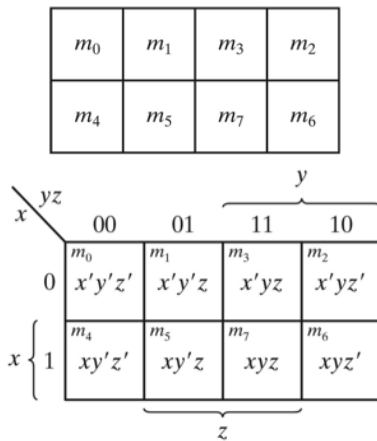
x	y	f
0	0	0
0	1	1
1	0	1
1	1	1



- $f = x + y$



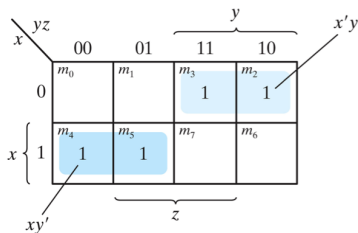
# Three-Variable K-Map





# Three-Variable K-Map

- $F(x, y, z) = \sum(2, 3, 4, 5)$



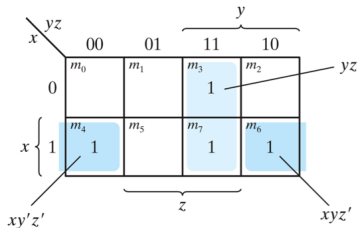
- $F = x'y + xy'$





# Three-Variable K-Map

- $F(x, y, z) = \sum(3, 4, 6, 7)$

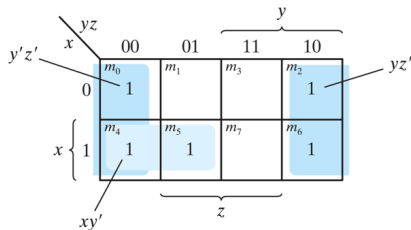


- $F = yz + xz'$



# Three-Variable K-Map

- $F(x, y, z) = \sum(0, 2, 4, 5, 6)$

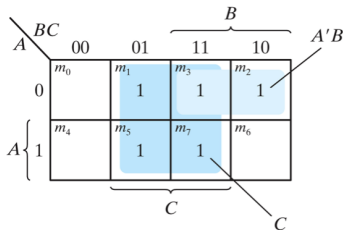


- $F = z' + xy'$



# Three-Variable K-Map

- $F(A, B, C) = \sum(1, 2, 3, 5, 7)$



- $F = C + A'B$



# Summary

- 1 The Map Method
  - Two-Variable K-Map
  - Three-Variable K-Map



# Next Lecture

- Four-Variable K-Map.