

## Quine-McCluskey example - Step 1 - Find prime implicants

$$f = \bar{a}\bar{b}\bar{c}\bar{d} + \bar{a}cd + ab\bar{c} + ab\bar{d} + bcd$$

0000	0-11	110-	11-0	-111
0000	0011	1100	1100	0111
	0111	1101	1110	1111

0 0000

3	0011	3, 7	0-11	12, 13, 14, 15	11--
12	1100	12, 13	110-	(12, 14, 13, 15	11--)
		12, 14	11-0		

7	0111	7, 15	-111
13	1101	13, 15	11-1
14	1110	14, 15	111-

15 1111

prime implicants:

0000	$\bar{a}\bar{b}\bar{c}\bar{d}$
0-11	$\bar{a}cd$
-111	$bcd$
11--	$ab$

$$f = \bar{a}\bar{b}\bar{c}\bar{d} + \bar{a}cd + bcd + ab$$

not necessarily minimal

**Quine-McCluskey example - Step 2 - Select smallest set of prime implicants**

	$\sim a \sim b \sim c \sim d$	$\sim a c d$	$b c d$	$a b$
	0000	0-11	-111	11--
	0	3, 7	7, 15	12, 13, 14, 15
0	x			
3		x		
12				x
7		x	x	
13				x
14				x
15			x	x

essential prime implicants:  $\sim a \sim b \sim c \sim d$ ,  $\sim a c d$ ,  $a b$

$$f = \sim a \sim b \sim c \sim d + \sim a c d + a b$$