

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	3, 15	12, 13, 14, 15
0	x			
3		x	x	
12				x
7		x		
13				x
14				x
15			x	x

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

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