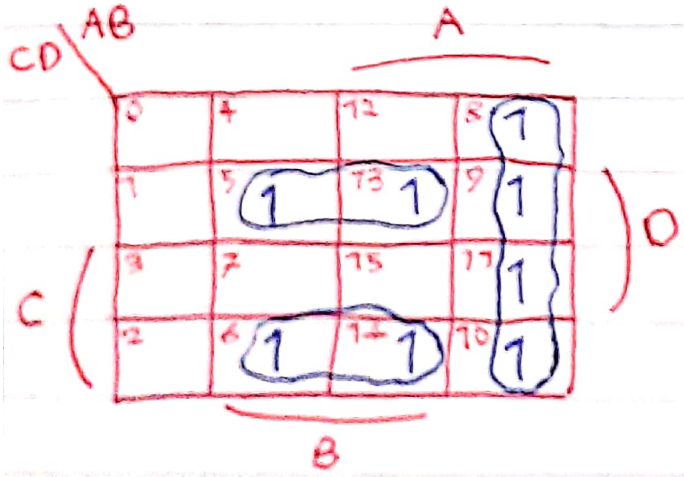
Truth table

A	B	C	D	F	
0	0	0	0	0	
0	0	0	1	0	
0	0	1	0	0	
0	0	1	1	0	
0	1	0	0	0	
0	1	0	1	1	m_5
0	1	1	0	1	m_6
0	1	1	1	0	
1	0	0	0	1	m_8
1	0	0	1	1	m_9
1	0	1	0	1	m_{10}
1	0	1	1	1	m_{11}
1	1	0	0	0	
1	1	0	1	1	m_{13}
1	1	1	0	1	m_{14}
1	1	1	1	0	

Karnaugh map



simplify

$$F = A\bar{B} + BC\bar{D} + B\bar{C}D$$

implementation with NAND gates

$$\overline{F} = (A\bar{B} + BC\bar{D} + B\bar{C}D)$$

$$F = \overline{(\overline{(A\bar{B})}\ \overline{(BC\bar{D})}\ \overline{(B\bar{C}D)})}$$

$$F = \text{NAND}(\text{NAND}(A, \bar{B}), \text{NAND}(B, C, \bar{D}), \text{NAND}(B, \bar{C}, D))$$

Assume that inputs complements are available.