

5.4 (a)

AB \ CD	00	01	11	10
00	1	1	1	1
01			1	
11	1		1	1
10	1	1	1	1

$$F = BD' + B'CD + ABC + ABC'D + B'D'$$

(b)

AB \ CD	00	01	11	10
00	1	1	1	1
01			1	
11	1		1	1
10	1	1	1	1

$$F = D' + B'C + AB$$

(c)

AB \ CD	00	01	11	10
00	1	1	1	1
01	0	0	1	0
11	1	0	1	1
10	1	1	1	1

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

5.8

(a)

cd \ ab	00	01	11	10
00	0	1	0	0
01	0	1	1	1
11	X	X	X	0
10	1	0	X	1

$$f = a'bc' + ac'd + b'cd'$$

cd \ ab	00	01	11	10
00	0	1	0	0
01	0	1	1	1
11	X	X	X	0
10	1	0	X	1

$$f = (a+b+c)(a'+c+d)(c'+d')(b'+c')$$

(b)

cd \ ab	00	01	11	10
00	0	1	X	X
01	1	0	0	0
11	1	X	X	1
10	X	0	X	0

$$f = bc'd' + a'b'd + cd$$

cd \ ab	00	01	11	10
00	0	1	X	X
01	1	0	0	0
11	1	X	X	1
10	X	0	X	0

$$f = (b+d)(a'+c)(b'+d')(c'+d) \quad \times$$

$$\text{or } (b+d)(a'+c)(b'+d')(b'+c') \quad \times$$

5.19

(a)

C_1	C_2	X_1	X_2	Z
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	1
0	1	0	0	0
0	1	0	1	1
0	1	1	0	1
0	1	1	1	0
1	0	0	0	1
1	0	0	1	1
1	0	1	0	0
1	0	1	1	1
1	1	0	0	1
1	1	0	1	0
1	1	1	0	0
1	1	1	1	1

(b)

$C_1 C_2$	00	01	11	10
$X_1 X_2$	00	0		
01	0		0	
11		0		
10	0		0	0

$$\begin{aligned}
 Z &= (C_1 + X_1 + X_2)(C_1 + C_2 + X_1) \\
 &\quad (C_1' + C_2' + X_1 + X_2') \\
 &\quad (C_1 + C_2' + X_1' + X_2') \\
 &\quad (C_1' + X_1' + X_2)(C_2 + X_1' + X_2) \quad \times \\
 \text{or } &(C_1 + X_1 + X_2)(C_1 + C_2 + X_1) \\
 &\quad (C_1' + C_2' + X_1 + X_2') \\
 &\quad (C_1 + C_2' + X_1' + X_2') \\
 &\quad (C_1' + X_1' + X_2)(C_1 + C_2 + X_2) \quad \times
 \end{aligned}$$

5.26

(a)

cd	ab	00	01	11	10
00		0	0		
01			0		0
11					X
10		0	0	0	X

$$f = \underline{(a+d)} \underline{(a+b'+c)} \underline{(a'+b+d')} \underline{(c'+d)}$$

(b)

cd	ab	00	01	11	10
00		0	0	X	1
01		1	0	0	1
11		1	X	1	0
10		0	X	0	0

$$\begin{aligned}
 f &= \underline{(a+d)} \underline{(b'+c)} \underline{(a'+b+c')} \underline{(c'+d)} \quad \times \\
 \text{or } &\underline{(a+d)} \underline{(b'+c)} \underline{(a'+b+c')} \underline{(b'+d)} \quad \times
 \end{aligned}$$

5.28

	ab	00	01	11	10
cd	00	1			1
	01	1	X	1	1
	11	1	1	X	
	10	1			1

$\therefore abcd = 0101$ and $abcd = 1111$ never occurs.

\therefore minterms 5 and 15 are don't care.

$$F = b'd' + a'd + c'd$$

5.34 (a)

	ab	00	01	11	10
cd	00	X	0	X	0
	01	1	X	1	X
	11	X	1	X	1
	10	1	X	0	X

• prime implicant

(b) prime implicants: $a'b'$, d , abc' , $a'c$, $b'c$

(c)

$$\left. \begin{aligned} f &= a'b' + d \\ &\text{or } a'c + d \\ &\text{or } b'c + d \end{aligned} \right\} *$$

(d)

	ab	00	01	11	10
cd	00	X	0	X	0
	01	1	X	1	X
	11	X	1	X	1
	10	1	X	0	X

• prime implicant

prime implicants: $c'd'$, bd' , ad' ,
 $a'bc'$, $ab'c'$, abc

(e)

$$\left. \begin{aligned} f &= (c+d)(b'+d) \\ &\text{or } (c+d)(a'+d) \\ &\text{or } (b'+d)(a'+d) \end{aligned} \right\} *$$

5.34

(a)

c d \ a b				
	00	01	11	10
00	X	1	X	
01		X		X
11	X	1	X	1
10	1	X	1	X

(b)

c d \ a b				
	00	01	11	10
00	X	1	X	
01		X		X
11	X	1	X	1
10	1	X	1	X

$$PI = bd', ab', a'd', c, ab'd.$$

(c)

$$f = bd' + c \text{ or } a'b + c \text{ or } a'd' + c.$$

(d)

c d \ a b				
	00	01	11	10
00	X		X	0
01	0	X	0	X
11	X		X	
10		0		X

$$PI = (c+d'), (a'+c), (b+c) \\ (a+b+d'), (a+b'+c+d), (a'+b'+d') \\ (a'+b+d)$$

(e)

$$f = (c+d')(a'+c) \text{ or } (b+c)(c+d') \text{ or } (b+c)(a'+c).$$

5.42 (a)

		WX			
		00	01	11	10
Yz	00	x	0	1	0
	01	x	1	1	1
	11	1	0	1	0
	10	0	0	1	1

$$F = \underline{V'XY'Z'} + VWX + \underline{X'Y'Z} + \underline{VZ} + \underline{WX'YZ'}$$

(b)

		WX			
		00	01	11	10
Yz	00	x	0	1	0
	01	x	1	1	1
	11	1	1	1	1
	10	0	0	1	1

$$F = \underline{(X+Y+Z)} \underline{(V'+W+Z)} \underline{(V+X'+Z')} \underline{(V+Y'+Z')} \underline{(V+X'+Y')}$$