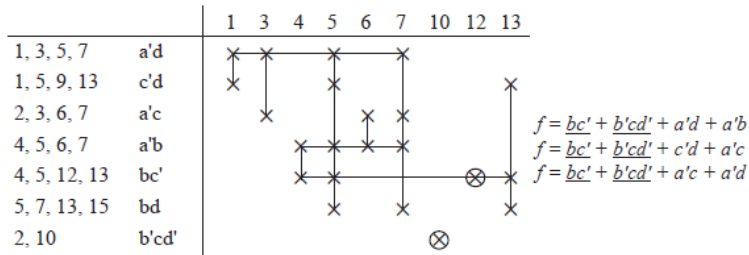


6.4

1	0001✓	1, 3	00-1✓	1, 3, 5, 7	0--1	a'd
2	0010✓	1, 5	0-01✓	<del>1, 5, 3, 7</del>	<del>0--1</del>	
4	0100✓	1, 9	-001✓	1, 5, 9, 13	--01	c'd
3	0011✓	2, 3	001-✓	<del>1, 9, 5, 13</del>	<del>--01</del>	
5	0101✓	2, 6	0-10✓	2, 3, 6, 7	0-1-	a'c
6	0110✓	2, 10	-010 b'cd'	<del>2, 6, 3, 7</del>	<del>0-1-</del>	
9	1001✓	4, 5	010-✓	4, 5, 6, 7	01--	a'b
10	1010✓	4, 6	01-0✓	4, 5, 12, 13	-10-	bc'
12	1100✓	4, 12	-100✓	<del>4, 6, 5, 7</del>	<del>01--</del>	
7	0111✓	3, 7	0-11✓	<del>4, 12, 5, 13</del>	<del>-10-</del>	
13	1101✓	5, 7	01-1✓	5, 7, 13, 15	-1-1	bd
15	1111✓	5, 13	-101✓	<del>5, 13, 7, 15</del>	<del>-1-1</del>	
		6, 7	011-✓			
		9, 13	1-01✓			
		12, 13	110-✓			
		7, 15	-111✓			
		13, 15	11-1✓			
		13, 15	11-1✓			

Prime implicants:  $b'cd'$ ,  $a'd$ ,  $c'd$ ,  $a'c$ ,  $a'b$ ,  $bc'$ ,  $bd$



6.5

1	0001✓	1, 5	0-01✓	1, 5, 9, 13	--01	$CD$
4	0100✓	1, 9	-001✓	<del>1, 9, 5, 13</del>	<del>--01</del>	
8	1000✓	4, 5	010-✓	4, 5, 12, 13	-10-	$BC'$
5	0101✓	4, 12	-100✓	<del>4, 12, 5, 13</del>	<del>-10-</del>	
9	1001✓	8, 9	100-✓	5, 7, 13, 15	-1-1	$BD$
12	1100✓	8, 12	1-00✓	5, 13, 7, 15	-1-1	
7	0111✓	5, 7	01-1✓	8, 9, 12, 13	1-0-	$AC'$
11	1011✓	5, 13	-101✓	<del>8, 12, 9, 13</del>	<del>1-0-</del>	
13	1101✓	9, 11	10-1✓	9, 11, 13, 15	1--1	$AD$
14	1110✓	9, 13	1-01✓	<del>9, 13, 11, 15</del>	<del>1--1</del>	
15	1111✓	12, 13	110-✓	12, 13, 14, 15	11--	$AB$
		12, 14	11-0✓	<del>12, 14, 13, 15</del>	<del>11--</del>	
		7, 15	-111✓			
		11, 15	1-11✓			
		13, 15	11-1✓			
		14, 15	111-✓			

Prime implicants:  $CD$ ,  $BC'$ ,  $BD$ ,  $AC'$ ,  $AD$ ,  $AB$

6.5

(contd)

		9	12	13	15
P1	(1, 5, 9, 13)	$CD$	x	x	
P2	(4, 5, 12, 13)	$BC$		x	x
P3	(5, 7, 13, 15)	$BD$		x	x
P4	(8, 9, 12, 13)	$AC$	x	x	x
P5	(9, 11, 13, 15)	$AD$	x	x	x
P6	(12, 13, 14, 15)	$AB$	x	x	x

$$\begin{aligned}
 & (P1 + P4 + P5) (P2 + P4 + P6) (P1 + P2 + P3 + P4 + P5 + P6) (P3 + P5 + P6) \\
 & = (P4 + P1P2 + P1P6 + P2P5 + P5P6) (P3 + P5 + P6) \\
 & = P3P4 + P4P5 + P4P6 + P1P2P3 + P1P2P5 + P1P2P6 + P1P3P6 \\
 & + P1P5P6 + P1P6 + P2P3P5 + P2P5 + P2P5P6 + P3P5P6 + P5P6 = 1
 \end{aligned}$$

$$F = (AC' + BD) \text{ or } (AD + BC') \text{ or } (AD + AC') \text{ or } (AB + AD) \text{ or } (AB + AC') \text{ or } (AB + C'D)$$

6.6 (a)

		A B			
		00	01	11	10
C D	00	1	1		
	01	E	1		1
	11		1	E	X
	10		X		

$$\begin{aligned}
 F &= MS_0 + EMS_1 = AB + A'C'D' + \\
 & \quad ABD + E(A'C' + ACD) \\
 & \text{or } E(A'C' + BCD)
 \end{aligned}$$

		A B			
		00	01	11	10
C D	00	1	0		
	01		1		1
	11		1		X
	10		X		

$$MS_0 = A'C'D' + A'B + A'BD$$

		A B			
		00	01	11	10
C D	00	X	X		
	01	1	X		X
	11		X	1	X
	10		X		

$$\begin{aligned}
 MS_1 &= A'C' + ACD \\
 MS_1 &= A'C' + BCD
 \end{aligned}$$

6.6 (b)

		A B			
		00	01	11	10
C D	00	1		F	E
	01	X	G	1	X
	11	1	X	1	
	10	X	E	X	

		A B			
		00	01	11	10
C D	00	1			
	01	X		1	X
	11	1	X	1	
	10	X		X	

$$MS_0 = A'B' + A'BD$$

		A B			
		00	01	11	10
C D	00	X			1
	01	X		X	X
	11	X	X	X	
	10	X	1	X	

$$\begin{aligned}
 MS_1 &= B'C' + A'C \\
 MS_1 &= B'C' + BC
 \end{aligned}$$

		A B			
		00	01	11	10
C D	00	X		1	
	01	X		X	X
	11	X	X	X	
	10	X		X	

$$MS_2 = AB$$

		A B			
		00	01	11	10
C D	00	X			
	01	X	1	X	X
	11	X	X	X	
	10	X		X	

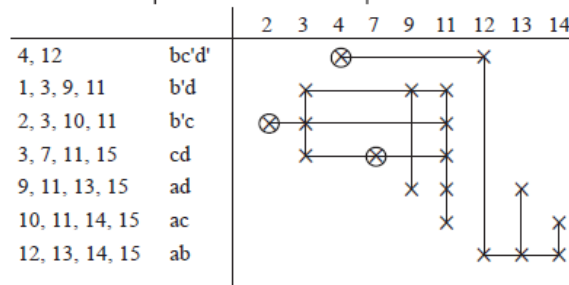
$$MS_3 = AD \text{ or } C'D \text{ or } BD$$

$$\begin{aligned}
 Z &= A'B' + ABD + E(B'C' + A'C) + \\
 & \quad F(AB) + G(A'D)
 \end{aligned}$$

6.9 (a)

1	0001✓	1, 3	00-1✓	1, 3, 9, 11	-0-1 b'd
2	0010✓	1, 9	-001✓	<del>1, 9, 3, 11</del>	<del>-0-1</del>
4	0100✓	2, 3	001-✓	2, 3, 10, 11	-01- b'c
3	0011✓	2, 10	-010✓	<del>2, 10, 3, 11</del>	<del>-01-</del>
9	1001✓	4, 12	-100 bc'd'	3, 7, 11, 15	--11 cd
10	1010✓	3, 7	0-11✓	<del>3, 11, 7, 15</del>	<del>--11</del>
12	1100✓	3, 11	-011✓	9, 11, 13, 15	1--1 ad
7	0111✓	9, 11	10-1✓	<del>9, 13, 11, 15</del>	<del>1--1</del>
11	1011✓	9, 13	1-01✓	10, 11, 14, 15	1-1- ac
13	1101✓	10, 11	101-✓	<del>10, 14, 11, 15</del>	<del>1-1-</del>
14	1110✓	10, 14	1-10✓	12, 13, 14, 15	11-- ab
15	1111✓	12, 13	110-✓	<del>12, 14, 13, 15</del>	<del>11--</del>
		12, 14	11-0✓		
		7, 15	-111✓		
		11, 15	1-11✓		
		13, 15	11-1✓		
		14, 15	111-✓		

Prime implicants:  $bc'd'$ ,  $b'd$ ,  $b'c$ ,  $cd$ ,  $ad$ ,  $ac$ ,  $ab$



$$f = b'c + bc'd' + cd + b'd + ab$$

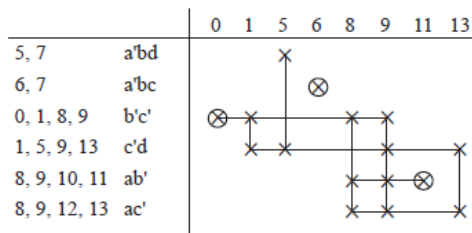
$$f = b'c + \overline{bc'd'} + \overline{cd} + ad + ab$$

$$f = b'c + \overline{bc'd'} + \overline{cd} + ad + ac$$

6.9 (b)

0	0000✓	0, 1	000-✓	0, 1, 8, 9	-00- b'c'
1	0001✓	0, 8	-000✓	<del>0, 8, 1, 9</del>	<del>-00-</del>
8	1000✓	1, 5	0-01✓	1, 5, 9, 13	--01 c'd
5	0101✓	1, 9	-001✓	<del>1, 9, 5, 13</del>	<del>--01</del>
6	0110✓	8, 9	100-✓	8, 9, 10, 11	10-- ab'
9	1001✓	8, 10	10-0✓	<del>8, 10, 9, 11</del>	<del>10--</del>
10	1010✓	8, 12	1-00✓	8, 9, 12, 13	1-0- ac'
12	1100✓	5, 7	01-1 a'bd	<del>8, 12, 9, 13</del>	<del>1-0-</del>
7	0111✓	5, 13	-101✓		
11	1011✓	6, 7	011- a'bc		
13	1101✓	9, 11	10-1✓		
		9, 13	1-01✓		
		10, 11	101-✓		
		12, 13	110-✓		

Prime implicants:  $a'bd$ ,  $a'bc$ ,  $b'c'$ ,  $c'd$ ,  $ab'$ ,  $ac'$



$$f = a'bc + b'c' + ab' + c'd$$

6.9 (c)  $f = a'b + bc + ab'c' + bd + cd$   
 $f = a'b + bc + ab'c' + ad + cd$   
 $f = a'b + bc + ab'c' + ad + a'c$

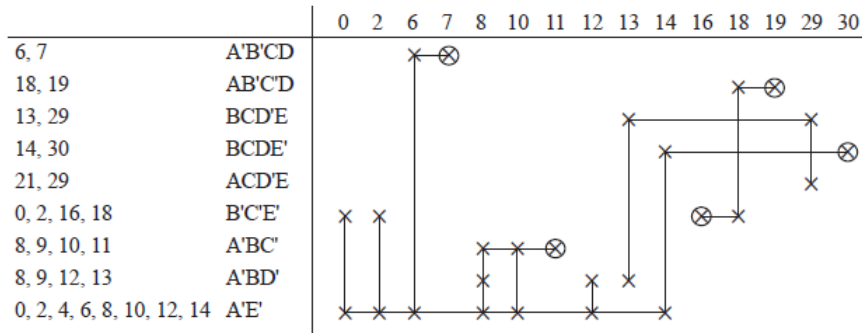
6.10 Prime implicants:  $abc'$ ,  $bc'd$ ,  $a'bd$ ,  $b'cd$ ,  $a'c$ ,  $a'b'd'$

$$f = abc' + b'cd + a'c + a'b'd' + a'bd$$

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

6.11

0	00000✓	0, 2	000-0✓	0, 2, 4, 6	00--0✓	0, 2, 4, 6, 8, 10, 12, 14	0---0 A'E'
2	00010✓	0, 4	00-00✓	0, 2, 8, 10	0-0-0✓	0, 2, 8, 10, 4, 6, 12, 14	0---0
4	00100✓	0, 8	0-000✓	0, 2, 16, 18	-00-0 B'CE'	0, 4, 8, 12, 2, 6, 10, 14	0---0
8	01000✓	0, 16	-0000✓	0, 4, 2, 6	00--0		
16	10000✓	2, 6	00-10✓	0, 4, 8, 12	0--00✓		
6	00110✓	2, 10	0-010✓	0, 8, 2, 10	0-0-0		
9	01001✓	2, 18	-0010✓	0, 8, 4, 12	0--00		
10	01010✓	4, 6	001-0✓	0, 16, 2, 18	-00-0		
12	01100✓	4, 12	0-100✓	2, 6, 10, 14	0--10✓		
18	10010✓	8, 9	0100-✓	2, 10, 6, 14	0-10		
7	00111✓	8, 10	010-0✓	4, 6, 12, 14	0-1-0✓		
11	01011✓	8, 12	01-00✓	4, 12, 6, 14	0-1-0		
13	01101✓	16, 18	100-0✓	8, 9, 10, 11	010-- A'BC'		
14	01110✓	6, 7	0011- A'B'CD	8, 9, 12, 13	01-0- A'BD'		
19	10011✓	6, 14	0-110✓	8, 10, 9, 11	010--		
21	10101✓	9, 11	010-1✓	8, 10, 12, 14	01--0✓		
29	11101✓	9, 13	01-01✓	8, 12, 9, 13	01-0-		
30	11110✓	10, 11	0101-✓	8, 12, 10, 14	01--0		
		10, 14	01-10✓				
		12, 13	0110-✓				
		12, 14	011-0✓				
		18, 19	1001- AB'C'D				
		13, 29	-1101 BCD'E				
		14, 30	-1110 BCDE'				
		21, 29	1-101 ACDE'				



$$F = \underline{BCDE'} + \underline{AB'C'D} + \underline{B'CE'} + \underline{A'BC'} + \underline{A'BD'} + \underline{BCDE} + \underline{A'E'}$$

6.12 (a)

0	00000✓	0, 1	0000-✓	0, 1, 2, 3	000--✓	0, 1, 2, 3, 8, 9, 10, 11	0-0--*
1	00001✓	0, 2	000-0✓	0, 1, 8, 9	0-00-✓		
2	00010✓	0, 4	00-00*	0, 2, 8, 10	0-0-0✓		
4	00100✓	0, 8	0-000✓	1, 3, 9, 11	0-0-1✓		
8	01000✓	1, 3	000-1✓	2, 3, 10, 11	0-01-✓		
3	00011✓	1, 9	0-001✓	8, 9, 10, 11	010--✓		
9	01001✓	2, 3	0001-✓	3, 11, 19, 27	--011*		
10	01010✓	2, 10	0-010✓				
11	01011✓	8, 9	0100-✓				
19	10011✓	8, 10	010-0✓				
21	10101✓	3, 11	0-011✓				
22	10110✓	3, 19	-0011✓				
28	11100✓	9, 11	010-1✓				
23	10111✓	10, 11	0101-✓				
27	11011✓	11, 27	-1011✓				
29	11101✓	19, 23	10-11*				
30	11110✓	19, 27	1-011✓				
		21, 23	101-1*				
		21, 29	1-101*				
		22, 23	1011-*				
		22, 30	1-110*				
		28, 29	1110-*				
		28, 30	111-0*				

Prime Implicants: A'B'D'E', AB'DE, AB'CE, ACD'E, AB'CD, ACDE', ABCD', ABCE', C'DE, A'C'

(0,4)	A'B'DE'	X ⊗
(19, 23)	AB'DE	X ⊗
(21, 23)	AB'CE	X ⊗
(21, 29)	ACDE	X ⊗
(22, 23)	AB'CD	X ⊗
(22, 30)	ACDE'	X ⊗
(28, 29)	ABCD	X ⊗
(28, 30)	ABCE'	X ⊗
(3, 11, 19, 27)	CDE	X ⊗
(0, 1, 2, 3, 8, 9, 10, 11)	A'C'	X ⊗

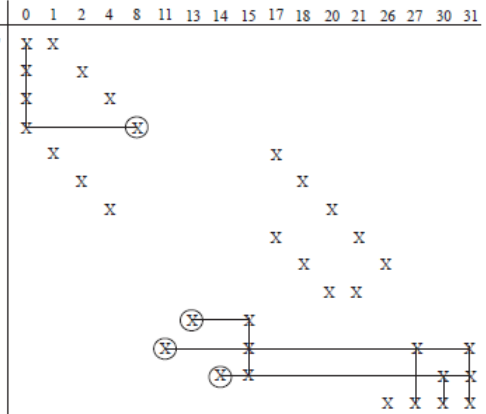
$$f = A'C' + C'DE + A'B'D'E' + AB'CE + ACDE' + ABCD'$$

$$f = A'C' + C'DE + A'B'D'E' + ACDE' + AB'CD + ABCE'$$

6.12 (b)

0	0000√	0, 1	0000-*	11, 15, 27, 31	-1-11*
1	00001√	0, 2	000-0*	14, 15, 30, 31	-111-*
2	00010√	0, 4	00-00*	26, 27, 30, 31	11-1-*
4	00100√	0, 8	0-000*		
8	01000√	1, 17	-0001*		
17	10001√	2, 18	-0010*	Q (0, 1)	A'B'CD'
18	10010√	4, 20	-0100*	R (0, 2)	A'B'CE'
20	10100√	17, 21	10-01*	S (0, 4)	A'B'DE'
11	01011√	18, 26	1-010*	(0, 8)	A'C'DE'
13	01101√	20, 21	1010-*	T (1, 17)	B'C'DE
14	10110√	11, 15	01-11√	U (2, 18)	B'C'DE'
21	10101√	11, 27	-1011√	V (4, 20)	B'C'DE'
26	11010√	13, 15	011-1*	W (17, 21)	AB'DE
15	01111√	14, 15	0111-√	X (18, 26)	AC'DE'
27	11011√	14, 30	-1110√	Y (20, 21)	AB'CD'
30	11110√	26, 27	1101-√	(13, 15)	A'BCE
31	11111√	26, 30	11-10√	(11, 15, 27, 31)	BDE
		15, 31	-1111√	(14, 15, 30, 31)	BCD
		27, 31	11-11√	Z (26, 27, 30, 31)	ABD
		30, 31	1111-√		

Prime Implicants: A'B'D'E', AB'DE, AB'CE, ACD'E, AB'CD, AC'DE, ABCD', ABCE, C'DE, A'C'



Essential prime implicants: A'C'D'E', BDE, A'BCE, BCD

Petrick's Method for remaining minterms: (Q+T)(R+U)(S+V)(T+W)(U+X)(V+Y)(W+Z)(X+Z)

$$= (QW+T)(RX+U)(SY+V)(W+Y)(X+Z) = (QW+TW+TY)(RX+UX+UZ)(SY+V)$$

= (QSWY+STY+QVW+TVW+TVY)(RX+UX+UZ) There are four minimal choices from the first parenthesis. In the second parenthesis only UZ is minimal since Z has fewer literals than the other two PI's. The minimal solutions are (STY+QVW+TVW+TVY)(UZ)

6.12 (b)  $f = BCD + A'BCE + BDE + A'C'D'E' + ABD + B'C'DE' + AB'CD' + B'C'D'E' + A'B'D'E'$

(contd)  $f = BCD + A'BCE + BDE + A'C'D'E' + ABD + B'C'DE' + AB'D'E' + B'C'D'E' + A'B'CD'$

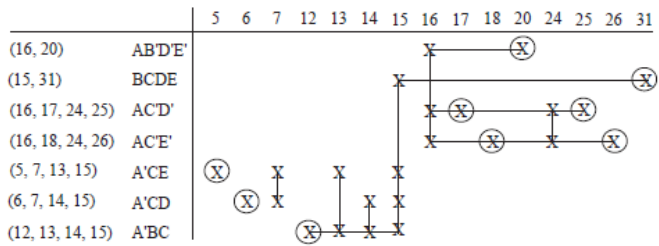
$$f = BCD + A'BCE + BDE + A'C'D'E' + ABD + B'C'DE' + AB'D'E' + B'C'D'E' + B'C'D'E'$$

$$f = BCD + A'BCE + BDE + A'C'D'E' + ABD + B'C'DE' + AB'CD' + B'C'D'E' + B'C'D'E'$$

6.13 (a)

16	10000√	16, 17	1000-√	16, 17, 24, 25	1-00-*
5	00101√	16, 18	100-0√	16, 18, 24, 26	1-0-0*
6	00110√	16, 20	10-00*	5, 7, 13, 15	0-1-1*
12	01100√	16, 24	1-000√	6, 7, 14, 15	0-11-*
17	10001√	5, 7	001-0√	12, 13, 14, 15	011-*
18	10010√	5, 13	0-101√		
20	10100√	6, 7	0011-√		
24	11000√	6, 14	0-110√		
7	00111√	12, 13	0110-√		
13	01101√	12, 14	011-0√		
14	01110√	17, 25	1-001√		
25	11001√	18, 26	1-010√		
26	11010√	24, 25	1100-√		
15	01111√	24, 26	110-0√		
31	11111√	7, 15	0-111√		
		13, 15	011-1√		
		14, 15	0111-√		
		15, 31	-1111*		

Prime implicants of f: AB'D'E', BCDE, AC'D', AC'E', A'CE, A'CD, A'BC



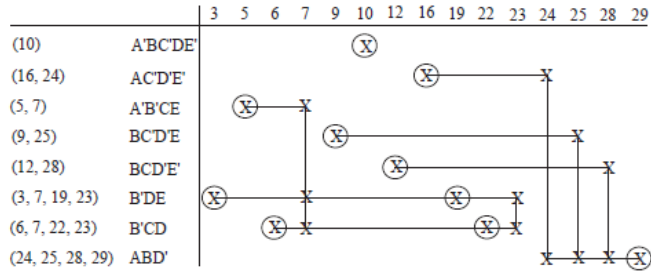
$$f(A, B, C, D, E) = AB'D'E' + BCDE + AC'D' + AC'E' + A'CE + A'CD + A'BC$$

$$f(A, B, C, D, E) = (A' + B + D + E)(B' + C' + D' + E)(A' + C + D)(A' + C + E)(A + C' + E)(A + C' + D)(A + B' + C')$$

6.13 (b)

16	10000√	16, 24	1-000*	3, 7, 19, 23	-0-11*
3	00011√	3, 7	00-11√	6, 7, 22, 23	-011-*
5	00101√	3, 19	-0011√	24, 25, 28, 29	11-0-*
6	00110√	5, 7	001-1*		
9	01001√	6, 7	0011-√		
10	01010*	6, 22	-0110√		
12	01100√	9, 25	-1001*		
24	11000√	12, 28	-1100*		
7	00111√	24, 25	1100-√		
19	10011√	24, 28	11-00√		
22	10110√	7, 23	-0111√		
25	11001√	19, 23	10-11√		
28	11100√	22, 23	1011-√		
23	10111√	25, 29	11-01√		
29	11101√	28, 29	1110-√		

Prime implicants of  $f'$ :  $A'BC'DE'$ ,  $AC'D'E'$ ,  $A'B'CE$ ,  $BC'D'E$ ,  $BC'D'E'$ ,  $B'DE$ ,  $B'CD$ ,  $ABD'$

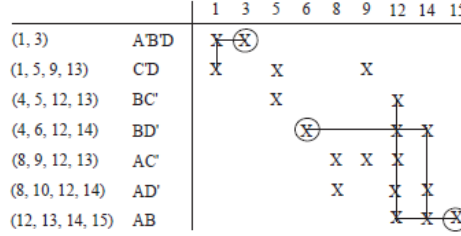


$f = A'BC'DE' + AC'D'E' + A'B'CE + BC'D'E + BCD'E' + B'DE + B'CD + ABD'$   
 $f = (A'+B'+D)(A'+C+D+E)(B'+C'+D+E)(B'+C+D+E)(B+C+D+E)(A+B+C'+E')(B+D'+E')(A+B'+C+D'+E)$

6.14 (a)

1	0001√	1, 3	00-1*	1, 5, 9, 13	--01*
4	0100√	1, 5	0-01√	4, 5, 12, 13	-10-*
8	1000√	1, 9	-001√	4, 6, 12, 14	-1-0*
3	0011√	4, 5	010-√	8, 9, 12, 13	1-0-*
5	0101√	4, 6	01-0√	8, 10, 12, 14	1--0*
6	0110√	4, 12	-100√	12, 13, 14, 15	11--*
9	1001√	8, 9	100-√		
10	1010√	8, 10	10-0√		
12	1100√	8, 12	1-00√		
13	1101√	5, 13	-101√		
14	1110√	6, 14	-110√		
15	1111√	9, 13	1-01√		
		10, 14	1-10√		
		12, 13	110-√		
		12, 14	11-0√		
		13, 15	11-1√		
		14, 15	111-√		

Prime implicants:  $A'B'D$ ,  $AB$ ,  $A'C'$ ,  $C'D$ ,  $AD'$ ,  $B'D'$ ,  $B'C'$



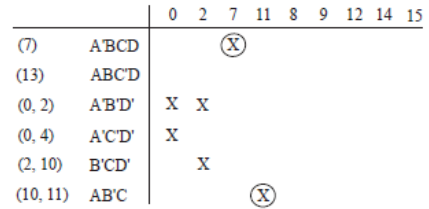
Essential Prime Implicants:  $AB$ ,  $BD'$ ,  $A'B'D$

$f = AB + BD' + A'B'D + C'D + AD'$   
 $f = AB + BD' + A'B'D + A'C' + C'D$   
 $f = AB + BD' + A'B'D + A'C' + B'C'$

6.14 (b)

0	0000√	0, 2	00-0*
2	0010√	0, 4	0-00*
4	0100√	2, 10	-010*
10	1010√	10, 11	101-*
7	0111*		
11	1011*		
13	1101*		

Prime Implicants of  $f'$ :  $A'BCD$ ,  $A'B'D'$ ,  $ABC'D$ ,  $AB'C$ ,  $B'CD'$ ,  $A'C'D'$



Essential Prime Implicants:  $AB'C$ ,  $A'BCD$

$f' = AB'C + A'BCD + A'B'D'$

6.16

1	000001√	1, 3	0000-1√	1, 3, 17, 19	0-00-1 A'C'D'F
2	000010√	1, 17	0-0001√	<del>1, 17, 3, 19</del>	<del>0-00-1</del>
16	010000√	2, 3	00001-√	2, 3, 18, 19	0-001- A'C'D'E
32	100000√	2, 18	0-0010√	<del>2, 18, 3, 19</del>	<del>0-001-</del>
3	000011√	16, 17	01000-√	16, 17, 18, 19	0100-- A'BC'D'
17	010001√	16, 18	0100-0√	<del>16, 18, 17, 19</del>	<del>0100--</del>
18	010010√	16, 48	-10000 BC'D'E'F'		
48	110000√	32, 48	1-0000 AC'D'E'F'		
19	010011√	3, 19	0-0011√		
26	011010√	17, 19	0100-1√		
28	011100√	18, 19	01001-√		
15	001111 A'B'CDEF	18, 26	01-010 A'BD'E'F'		
29	011101√	26, 30	011-10 A'BCEF'		
30	011110√	28, 29	01110- A'BCDE'		
39	100111 AB'CDEF	28, 30	0111-0 A'BCDF'		
63	111111 ABCDEF				

Prime implicants of  $f'$ :  $A'BC'DE'$ ,  $AC'D'E'$ ,  $A'B'CE$ ,  $BC'D'E$ ,  $BC'D'E'$ ,  $B'DE$ ,  $B'CD$ ,  $ABD'$

6.16 (contd)		1	2	3	16	17	18	19	26	32	39	48	63
15	<u>A'B'CDEF</u>												
39	<u>AB'CDEF</u>										⊗		
63	<u>ABCDEF</u>												⊗
16, 48	<u>BC'DEF'</u>												
32, 48	<u>AC'DEF'</u>												
18, 26	<u>A'BD'EF'</u>												
26, 30	<u>A'BCEF'</u>												
28, 29	<u>A'BCDE'</u>												
28, 30	<u>A'BCDF'</u>												
1, 3, 17, 19	<u>A'C'DF</u>	⊗											
2, 3, 18, 19	<u>A'C'D'E</u>		⊗										
16, 17, 18, 19	<u>A'BC'D'</u>												

6.16 (a)  $G = \underline{A'B'CDEF} + \underline{ABCDEF} + \underline{A'C'DF} + \underline{A'C'D'E} + \underline{AC'D'EF'} + A'BC'D' + A'BD'EF'$   
 $G = \underline{A'B'CDEF} + \underline{ABCDEF} + \underline{A'C'DF} + \underline{A'C'D'E} + \underline{AC'D'EF'} + A'BC'D' + A'BCEF'$

6.16 (b) Essential prime implicants are underlined in 6.16 (a).

6.16 (c) If there were no don't cares, prime implicants 15, (26, 30), (28, 29), and (28, 30) are omitted. There is only one minimum solution. Same as (a), except delete the second equation.

6.17 (a)		1, 33	-00001*	11, 15, 43, 47	-01-11*
12	001100*	33, 35	1000-1*		
33	100001√	7, 15	00-111*		
7	000111√	11, 15	001-11√		
11	001011√	11, 43	-01011√		
35	100011√	35, 43	10-011*		
50	110010√	50, 54	110-10*		
15	001111√	50, 58	11-010*		
30	011110*	15, 47	-01111√		
43	101011√	43, 47	101-11√		
54	110110√	43, 59	1-1011*		
58	111010√	58, 59	11101-*		
60	111100*				
47	101111√				
59	111011√				

Prime Implicants:  $A'B'CDE'F'$ ,  $A'BCDEF'$ ,  $ABCDEF'$ ,  $B'C'D'E'F'$ ,  $AB'C'D'F'$ ,  $A'B'DEF'$ ,  $AB'D'EF'$ ,  $ABC'EF'$ ,  $ABD'EF'$ ,  $ACD'EF'$ ,  $ABCD'E'$ ,  $B'CEF'$

6.17 (a) (contd)		1	7	11	12	15	33	35	43	47	59	60
(12)	<u>A'B'CDEF</u>											
(30)	<u>A'BCDEF</u>											
(60)	<u>ABCDEF</u>											
(1, 33)	<u>B'CDEF</u>	⊗										
(33, 35)	<u>AB'C'DF</u>											
(7, 15)	<u>AB'DEF</u>		⊗									
(35, 43)	<u>AB'D'EF</u>											
(50, 54)	<u>ABC'EF</u>											
(50, 58)	<u>ABD'EF</u>											
(43, 59)	<u>ACDEF</u>											
(58, 59)	<u>ABCDE</u>											
(11, 15, 43, 47)	<u>B'CEF</u>											

Essential Prime Implicants:  $A'B'CDE'F'$ ,  $ABCDEF'$ ,  $B'C'D'E'F'$ ,  $A'B'DEF'$ ,  $B'CEF'$

$G = A'B'CDE'F' + ABCDEF' + B'C'D'E'F' + A'B'DEF' + B'CEF' + ACD'EF' + AB'C'D'F'$   
 $G = A'B'CDE'F' + ABCDEF' + B'C'D'E'F' + A'B'DEF' + B'CEF' + ACD'EF' + AB'D'EF'$   
 $G = A'B'CDE'F' + ABCDEF' + B'C'D'E'F' + A'B'DEF' + B'CEF' + ABCD'E' + AB'C'D'F'$   
 $G = A'B'CDE'F' + ABCDEF' + B'C'D'E'F' + A'B'DEF' + B'CEF' + ABCD'E' + AB'D'EF'$

6.17 (b) Prime Implicants of  $G'$ :  $AB'CE', AB'DE', AB'F', BDF, BE'F, BD'E', CE'F, CD'E', DE'F, C'DE', A'C'D'E, AC'D, D'F', C'F', BC', A'B, EF', BDE$

Essential Prime Implicants of  $G'$ :  $BC', AC'D, A'B, EF', A'C'D'E$

$$G' = BC' + AC'D + A'B + EF' + A'C'D'E + AB'F' + BDF + CD'E' + DE'F + C'F'$$

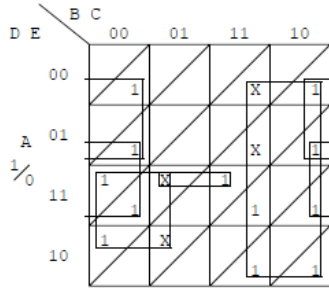
$$G' = BC' + AC'D + A'B + EF' + A'C'D'E + AB'F' + BDF + CE'F + C'DE' + D'F'$$

$$G' = BC' + AC'D + A'B + EF' + A'C'D'E + AB'F' + CD'E' + DE'F + C'F' + BDE$$

$$G' = BC' + AC'D + A'B + EF' + A'C'D'E + AB'F' + CE'F + C'DE' + D'F' + BDE$$

6.23 (a) Each minterm of the four variables  $A, B, C, D$  expands to two minterms of the five variables  $A, B, C, D, E$ . For example,

$$\begin{aligned} m_4(A,B,C,D) &= A'BC'D' \\ &= A'BC'D'E + A'BC'D'E \\ &= m_8(A,B,C,D,E) + m_9(A,B,C,D,E) \end{aligned}$$



$$\begin{aligned} F &= \underline{A'CD'} + \underline{AB} + \underline{ABD} + A'C'E + BCDE \\ F &= \underline{A'CD'} + \underline{AB} + \underline{ABD} + A'C'E + ACDE \end{aligned}$$

6.18 (a)  $-0-1 = (1, 3, 9, 11)$ ,  $-01- = (2, 3, 10, 11)$ ,  $--11 = (3, 7, 11, 15)$ ,  $1--1 = (9, 11, 13, 15)$

(b) maxterms = 0, 4, 5, 6, 8, 12, 14

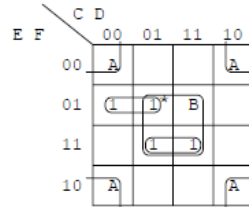
(c) don't cares = 1, 10, 15

(d)  $B'C, CD, AD$

6.23 (b) Prime implicants:  $A'C'D', A'B, AB'D, A'C'E, ACDE, BCDE, B'C'DE$

$$\begin{aligned} F &= \underline{A'C'D'} + \underline{A'B} + \underline{AB'D} + A'C'E + ACDE \\ F &= \underline{A'C'D'} + \underline{A'B} + \underline{AB'D} + A'C'E + BCDE \end{aligned}$$

6.24



\* This square contains  $1 + B$ , which reduces to 1.

$$G = \underline{C'E'F + DEF} + A \underline{(D'F')} + B \underline{(DF)}$$