Exercise 2.6

(a)

(X + Y)(X + Y') = X
Using 8D: X + (YY') = X
Using 5D: X + 0 = X
Using 1D: X = X

(b)

X (X + Y) = X
Using 8: XX + XY = X
Using 3D: X + XY = X
Using 8: X (1 + Y) = X
Using 2: X (1) = X
Using 1D: X = X

(c)

(X + Y') Y = XY
Using 8: XY + YY' = XY
Using 5D: XY + 0 = XY
Using 1: XY = XY

(d)

(X + Y)(X' + Z) = XZ + X'Y
Using 8: (X + Y) X' + (X + Y) Z = XZ + X'Y
Using 8: XX' + YX' + XZ + YZ = XZ + X'Y
Using 5D: 0 + YX' + XZ + YZ = XZ + X'Y
Using 1: X'Y + XZ + YZ = XZ + X'Y
Using 1D: X'Y (1) + XZ (1) + YZ (1) = XZ + X'Y
Using 5: X'Y (Z + Z') + XZ (Y + Y') + YZ (X + X') = XZ + X'Y
Using 8: X'YZ + X'YZ' + XYZ + XY'Z + XYZ + X'YZ = XZ + X'Y
Using 3: X'YZ + X'YZ' + XYZ + XY'Z = XZ + X'Y
Using 8: X'Y (Z + Z') + XZ (Y + Y') = XZ + X'Y
Using 5 and 1D: X'Y + XZ = XZ + X'Y

Exercise 2.19

(a) A’B’C’D’ + A’B’C’D + A’B’CD’ + A’BCD + AB’C’D’ + AB’C’D + AB’CD’ + ABCD

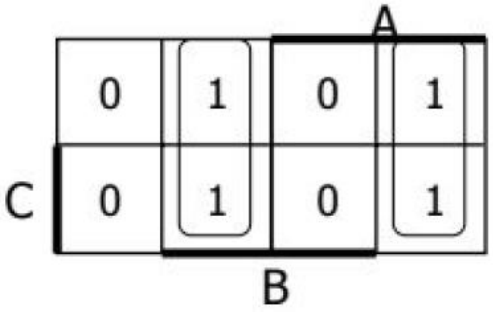
(b) (A + B + C’ + D’) (A + B’ + C + D) (A + B’ + C + D’) (A + B’ + C’ + D)
(A’ + B + C’ + D’) (A’ + B’ + C + D) (A’ + B’ + C + D’) (A’ + B’ + C’ + D)

(c) A’B’CD + A’BC’D’ + A’BC’D + A’BCD’ + AB’CD + ABC’D’+ ABC’D + ABCD’

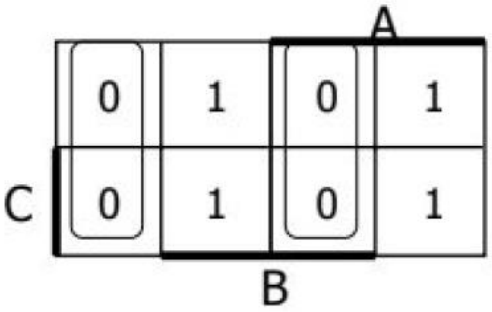
(d) (A + B + C + D) (A + B + C + D’) (A + B + C’ + D) (A + B’ + C’ + D’)
(A’ + B + C + D) (A’ + B + C + D’) (A’ + B + C’ + D) (A’ + B’ + C’ + D’)

Exercise 2.31

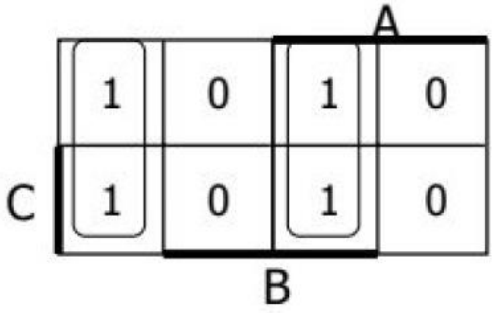
(a) W(A, B, C) = A'B + AB'



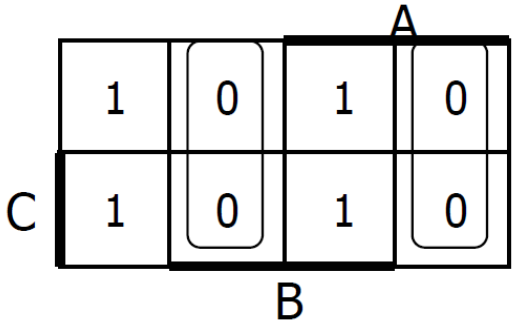
(b) W(A, B, C) = (A + B) (A' + B')



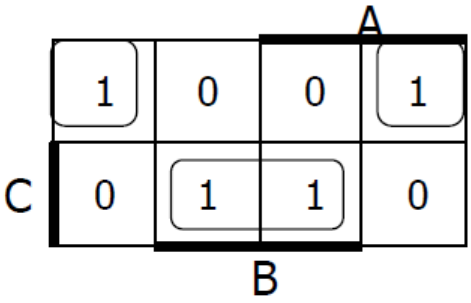
(c) W'(A, B, C) = A'B' + AB



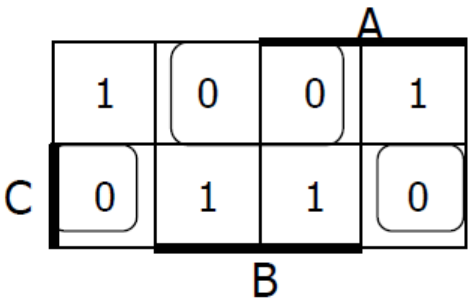
(d) W'(A, B, C) = (A' + B)(A + B')



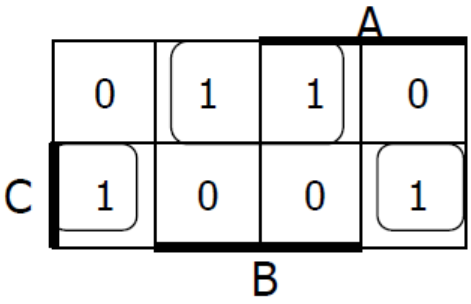
(a) X(A, B, C) = BC+B'C'



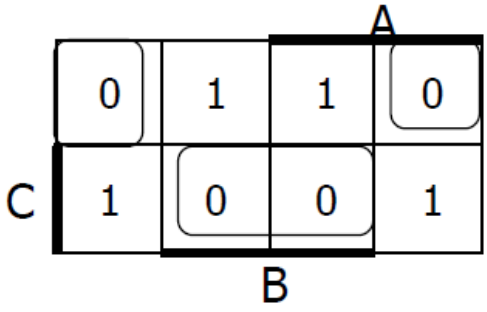
(b) X(A, B, C) = (B' + C) (B + C')



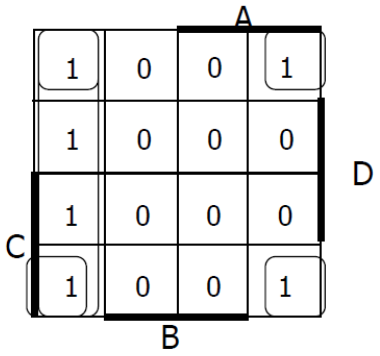
(c) X'(A, B, C) = B'C + BC'



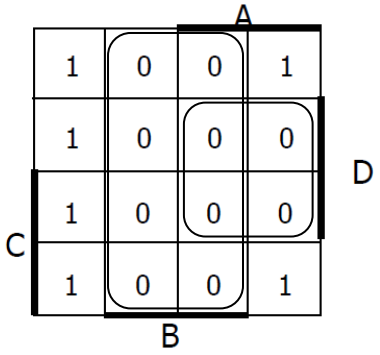
(d) X'(A, B, C) = (B + C) (B' + C')



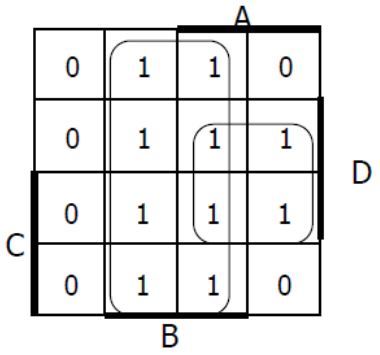
(a) Y(A, B, C, D) = A'B' + B'D'



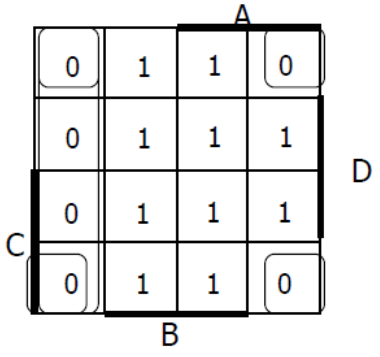
(b) Y(A, B, C, D) = $\overline{B}$ ($\overline{A}$ + $\overline{D}$)



(c) Y'(A, B, C) = B + AD



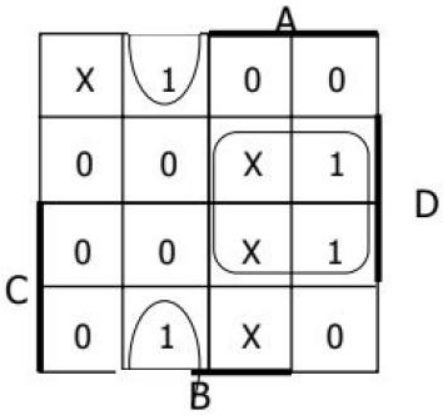
(d) Y'(A, B, C) = (A + B) (B + D)



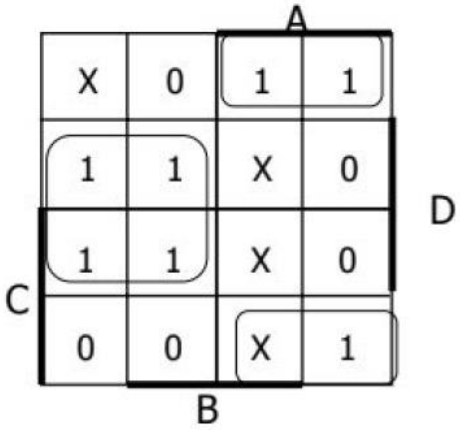
Exercise 2.35

Month Code	d30	d31
0000	X	X
0001	0	1
0010	0	0
0011	0	1
0100	1	0
0101	0	1
0110	1	0
0111	0	1
1000	0	1
1001	1	0
1010	0	1
1011	1	0
1100	0	1
1101	X	X
111X	X	X

d30 = Σm(4, 6, 9, 11) + Σd(0, 13, 14, 15)
=> d30 = AD + A'BD'



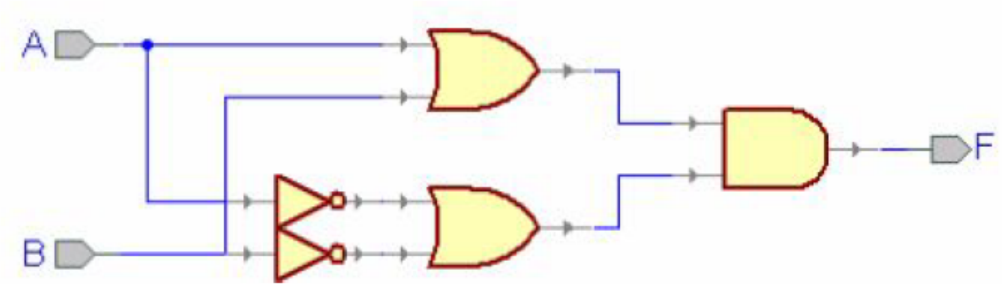
d31 = Σm(1, 3, 5, 7, 8, 10, 12) + Σd(0, 13, 14, 15)
=> d31 = A'D + AD'



Exercise 2.38

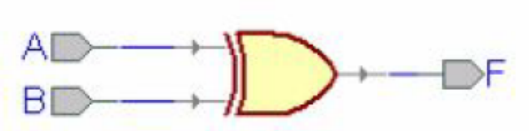
The following function implements the function in Figure Ex. 2.38 without using any NAND or NOR operations, as demonstrated by the figure.

$$F(A, B) = A' (A + B) + B' (A + B) = (A' + B') (A + B)$$



A minimized implementation using the fewest gates comes out to be the following function:

$$F(A, B) = (A' + B') (A + B) = (A'B + AB') = A \oplus B$$



Exercise 2.40

2.40 (a)

SHIFT	$\bar{I}_0$	$\bar{I}_1$	O_0	O_1
0	0	0	0	0
0	0	1	0	1
0	1	0	1	0
0	1	1	1	1
1	0	0	0	0
1	0	1	0	0
1	1	0	0	1
1	1	1	0	1

(b)

IN	SELECT	O_0	O_1
0	0	0	0
0	1	0	0
1	0	1	0
1	1	0	1

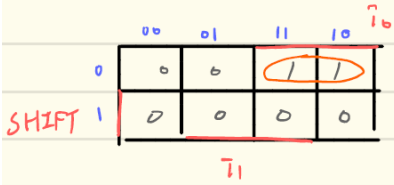
(c)

SELECT	$\bar{I}_0$	$\bar{I}_1$	OUT
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	0
1	1	1	1

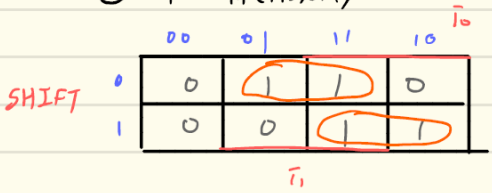
Exercise 2.41

2.4)

(a) ① $O_0 = \Sigma m(2,3) = \overline{SHIFT} \cdot \bar{I}_0$



② $O_1 = \Sigma m(1,3,6,7) = \overline{SHIFT} \cdot \bar{I}_1 + SHIFT \cdot \bar{I}_0$



(b) $O_0 = \Sigma m(2) = IN \cdot \overline{SELECT}$

$O_1 = \Sigma m(3) = IN \cdot SELECT$

(c) $OUT = \Sigma m(2,3,5,7) = \overline{SELECT} \cdot \bar{I}_0 + SELECT \cdot \bar{I}_1$