

問 8

カルノー図において"0"の部分に注目して括ると下図のようになる。

		X1			
		0	0	1	1
X3	X2				
	X4	0	1	1	0
0	0	1	1	1	1
0	1	1	1	0	0
1	1	0	0	0	0
1	0	1	1	0	0

$(\sim x3 \vee \sim x4)$
 $(\sim x1 \vee \sim x4)$
 $(\sim x1 \vee \sim x3)$

従って論理式は

$$f = (\sim x1 \vee \sim x3)(\sim x1 \vee \sim x4)(\sim x3 \vee \sim x4)$$

問 9

$$\begin{aligned}
 f &= (\sim x1 \vee \sim x3)(\sim x1 \vee \sim x4)(\sim x3 \vee \sim x4) \\
 &= (\sim x1 \vee \sim x1 \sim x4 \vee \sim x1 \sim x3 \vee \sim x3 \sim x4)(\sim x3 \vee \sim x4) \\
 &= (\sim x1 \vee \sim x3 \sim x4)(\sim x3 \vee \sim x4) \\
 &= \sim x1 \sim x3 \vee \sim x1 \sim x4 \vee \sim x3 \sim x4
 \end{aligned}$$

問 14

		X1			
		0	0	1	1
X3	X2				
	X4	0	1	1	0
0	0	1	1	1	1
1	1	1	1	0	0

$\sim x1$
 $\sim x3$

従って論理式は

$$f = \sim x1 \vee \sim x3$$

問 15

		X1			
		0	0	1	1
X3	X2				
	X4	0	1	1	0
0	0	1	0	0	0
0	1	1	1	0	0
1	1	1	1	1	0
1	0	0	0	0	0

$\sim x1 \cdot \sim x3$
 $x2 \cdot x4$
 $\sim x1 \cdot x4$

従って論理式は

$$f = \sim x1 \sim x3 \vee \sim x1 x4 \vee x2 x4$$

問 16

		x1			
		0	0	1	1
		x2			
		0	1	1	0
x3	x4				
		0	0	1	1
0	1	1	1	1	1
1	1	1	0	0	1
1	0	1	0	0	0

$\sim x_3$ (points to the first row of 1s)
 $\sim x_2 \cdot x_4$ (points to the second row of 1s)
 $\sim x_1 \cdot \sim x_2$ (points to the first column of 1s)

従って論理式は

$$f = \sim x_3 \vee \sim x_1 x_2 \vee \sim x_2 x_4$$

問 17

$$\begin{aligned}
 f &= \sim x_1 \sim x_3 \vee x_2 \sim x_3 \vee x_1 \sim x_3 \vee \sim x_1 \sim x_2 \vee \sim x_1 x_2 x_3 \\
 &= \sim x_3 (\sim x_1 \vee x_2 \vee x_1) \vee \sim x_1 (\sim x_2 \vee \sim x_3 \vee x_2 x_3) \\
 &= \sim x_3 (1 \vee x_2) \vee \sim x_1 (\sim (x_2 x_3) \vee x_2 x_3) \\
 &= \sim x_3 \vee \sim x_1
 \end{aligned}$$