

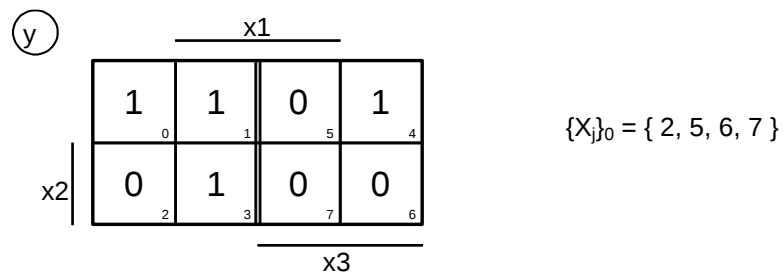
Digitaltechnik

6. Lösungsblatt

Institut für Technik der Informationsverarbeitung, Karlsruher Institut für Technologie (KIT)

1. Aufgabe:

1.1



1.2 Disjunktive Form: $y = \bar{x}_2 \bar{x}_1 \vee \bar{x}_3 x_1$

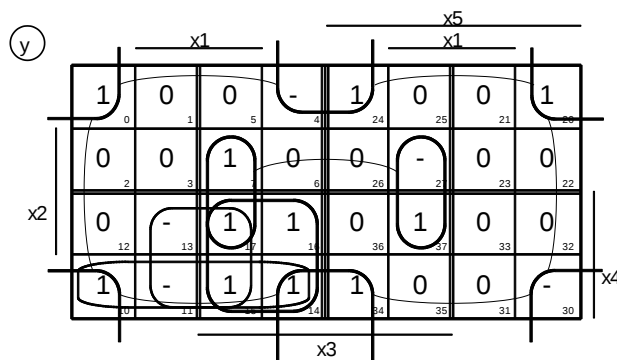
1.3 Konjunktive Form: $y = (\bar{x}_3 \vee \bar{x}_1) \& (\bar{x}_2 \vee x_1)$

1.4 Ausgehend von disjunktiver Form:

$$y = \overline{x_2} \overline{x_1} \vee \overline{x_3} x_1 = \overline{\overline{x_2} x_1} \vee \overline{\overline{x_3} x_1} = \overline{\overline{x_2} x_1} \& \overline{\overline{x_3} x_1} = (x_1 \& \overline{x_3}) \& (\overline{x_1} \& \overline{x_2}) \\ = (x_1 \& (\overline{x_3} \& x_3)) \& ((\overline{x_1} \& x_1) \& (\overline{x_2} \& x_2))$$

2. Aufgabe:

2.1:

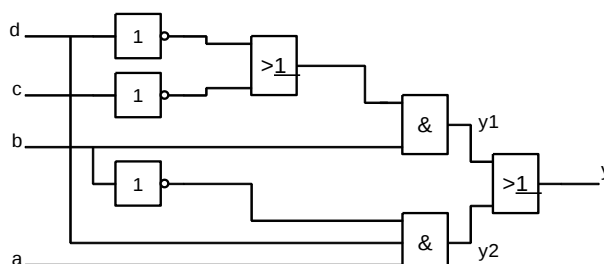


2.2:

$$y = (\bar{x}_5 \& x_4 \& x_3) v (\bar{x}_2 \& \bar{x}_1) v (x_3 \& x_2 \& x_1)$$

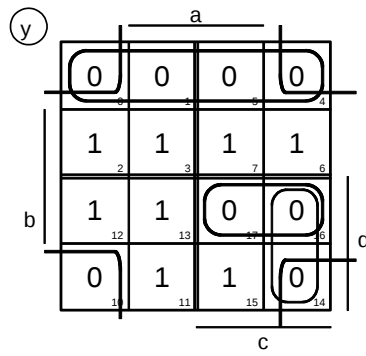
3. Aufgabe:

3.1



3.2

d	c	b	a	y
0	0	0	0	0
0	0	0	1	0
0	0	1	0	1
0	0	1	1	1
0	1	0	0	0
0	1	0	1	0
0	1	1	0	1
0	1	1	1	1
1	0	0	0	0
1	0	0	1	1
1	0	1	0	1
1	0	1	1	1
1	1	0	0	0
1	1	0	1	1
1	1	1	0	0
1	1	1	1	0

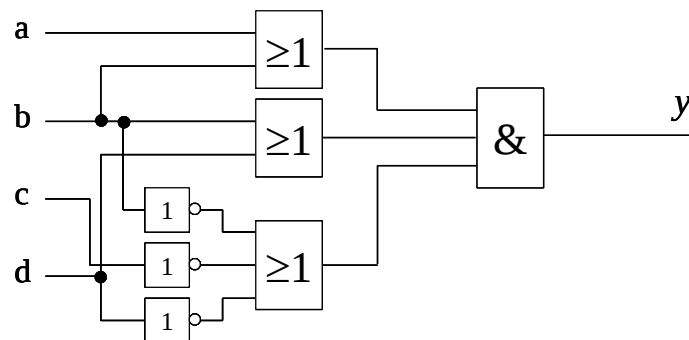


$$\{X_i\}_0 = \{0, 1, 4, 5, 10, 14, 16, 17\}$$

3.3: $W_1 = \bar{d} \vee \bar{c} \vee a$, $W_2 = \bar{d} \vee \bar{c} \vee \bar{b}$, $W_3 = d \vee b$, $W_4 = a \vee b$

3.4: KMF: $y = (d \vee b) \& (a \vee b) \& (\bar{d} \vee \bar{c} \vee \bar{b})$

3.5:



4. Aufgabe:

4.1

$$y = \bar{b} \& (\bar{a} \bar{c} \vee \bar{d} \bar{c} \vee a d c) \vee b \& 1$$

$$= \bar{b} \& F_{\bar{b}} \vee b \& F_b$$

4.2

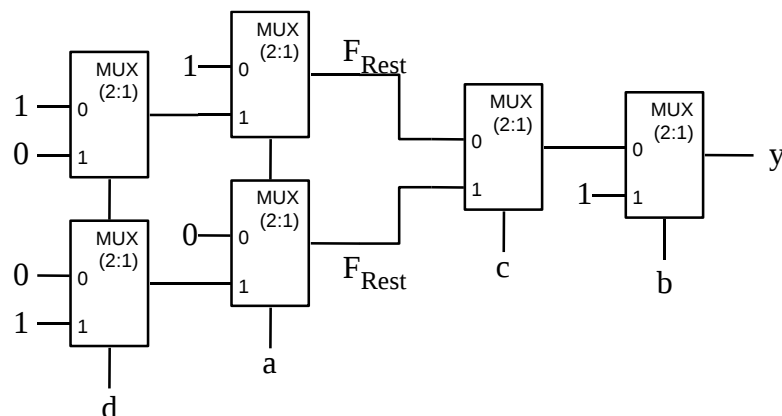
$$F_{\bar{b}} = \bar{c} \bar{a} \vee \bar{c} \bar{d} \vee a d c$$

$$= \bar{c} (\bar{a} \vee \bar{d}) \vee c (a d) = \bar{c} \& F_{\bar{bc}} \vee c \& F_{bc}$$

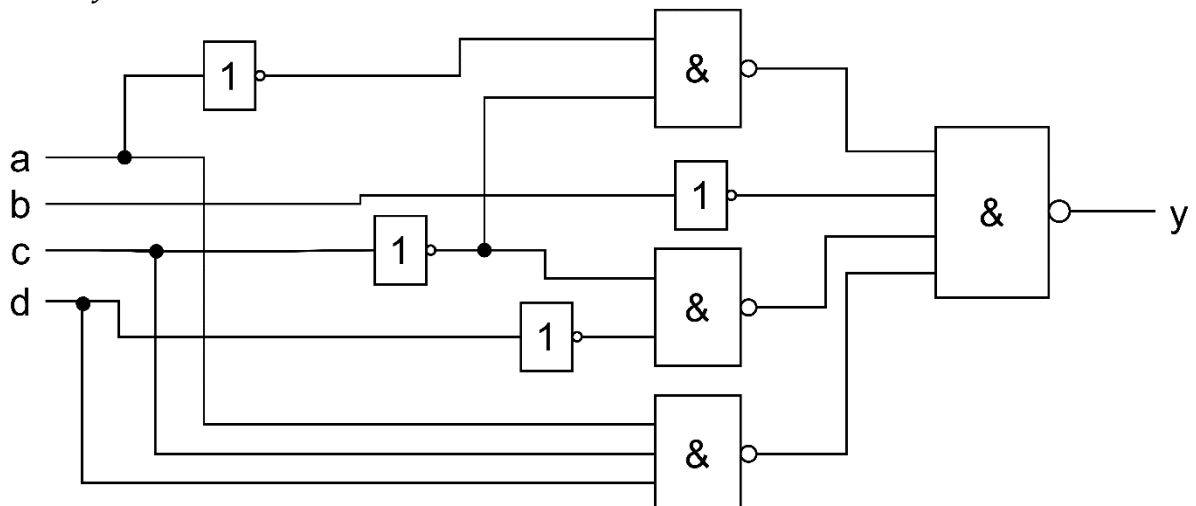
$$F_{\bar{bc}} = \bar{a} \& 1 \vee a \& \bar{d} \quad F_{bc} = \bar{a} \& 0 \vee a \& d$$

$$F_{\bar{bca}} = \bar{d} \& 1 \vee d \& 0 = \bar{d} \& F_{\bar{bcd}} \vee d \& F_{bcd}$$

$$F_{bca} = \bar{d} \& 0 \vee d \& 1 = \bar{d} \& F_{bcd} \vee d \& F_{bcd}$$



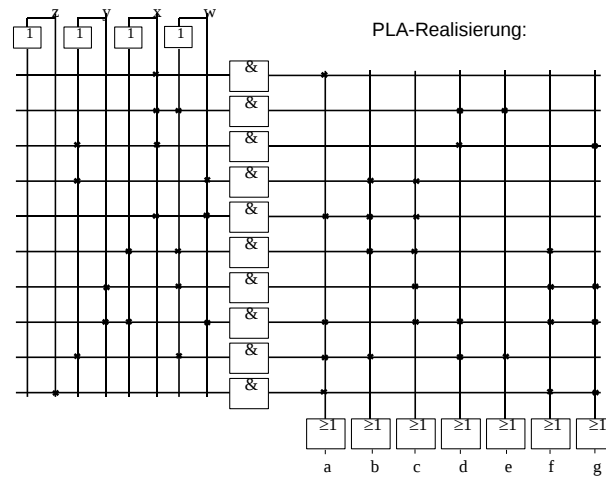
4.3 $y = \overline{\overline{\overline{a} \cdot \overline{c} \cdot \overline{b}} \cdot \overline{\overline{d} \cdot \overline{c} \cdot \overline{a} \cdot d \cdot c}}$



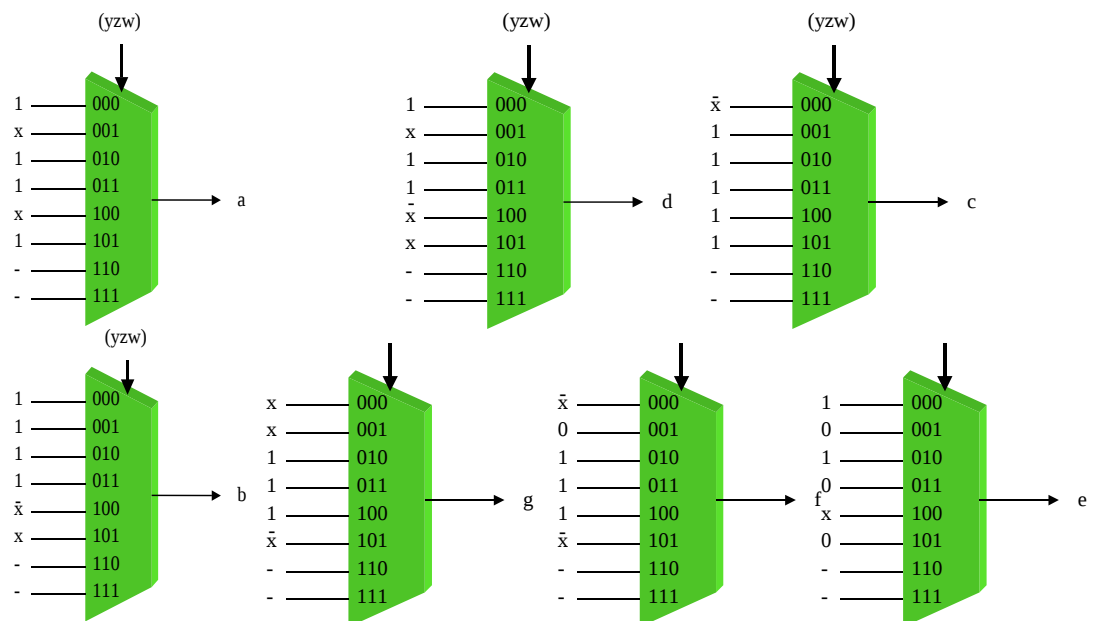
5. Aufgabe:

5.1 $a = z + x + \overline{w}y + wy$ $d = z + \overline{w}y + x\overline{w} + x\overline{y} + wy\overline{x}$ $g = z + x\overline{y} + \overline{w}y + \overline{x}y$
 $b = \overline{y} + \overline{w}x + wx$ $e = \overline{w}y + x\overline{w}$
 $c = y + w + \overline{x}$ $f = z + \overline{w}y + \overline{x}w + y\overline{x}$

5.2



5.3



Aufgabe F2:

F2.1: Es handelt sich um einen Moore Automaten, da die Ausgabe nur von Zuständen abhängt.

F2.2: Der Automat verfügt über 5 Zustände.

D.h., es werden $\lceil \lg 5 \rceil = 3$ Flip-Flops für die Realisierung des Automaten benötigt.

F2.3:

Diagramm	Tabelle
A	R
B	U
C	Z
D	W
E	T
G	X
L	Y

S^n	X	S^{n+1}	Y
R	-	Z	0
U	0 1	R Z	0
W	0 1	T W	0
Z	-	W	1
T	0 1	Z U	1