JOHANNES GUTENBERG UNIVERSITÄT MAINZ

Technische Informatik: Abgabe 6

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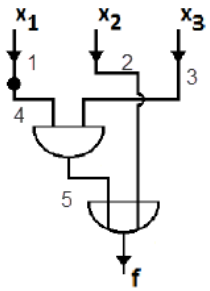
Exercise 6.1 (Circuit jam)

$f(x_1, x_2, x_3) = \bar{x}_1 x_3 + x_2$



$f_1, \ldots, f_5$ are 0-jams	$f_6, \ldots, f_a$ are 1-jams.
$f_1(x_1, x_2, x_3) = \bar{0}x_3 + x_2 = x_3 + x_2$	$f_6(x_1, x_2, x_3) = \bar{1}x_3 + x_2 = x_2$
$f_2(x_1, x_2, x_3) = \bar{x}_1 x_3 + 0 = \bar{x}_1 x_3$	$f_7(x_1, x_2, x_3) = \bar{x}_1 x_3 + 1 = 1$
$f_3(x_1, x_2, x_3) = \bar{x}_1 0 + x_2 = x_2$	$f_8(x_1, x_2, x_3) = \bar{x}_1 1 + x_2 = \bar{x}_1 + x_2$
$f_4(x_1, x_2, x_3) = 0x_3 + x_2 = x_2$	$f_9(x_1, x_2, x_3) = 1x_3 + x_2 = x_3 + x_2$
$f_5(x_1, x_2, x_3) = 0 + x_2 = x_2$	$f_a(x_1, x_2, x_3) = 1 + x_2 = 1$

Ausfalltafel:

#	x_1	x_2	x_3	f_1	f_2	f_3	f_4	f_5	f_6	f_7	f_8	f_9	f_a	f
0	0	0	0	0	0	0	0	0	0	1	1	0	1	0
1	0	0	1	1	1	0	0	0	0	1	1	1	1	1
2	0	1	0	1	0	1	1	1	1	1	1	1	1	1
3	0	1	1	1	1	1	1	1	1	1	1	1	1	1
4	1	0	0	0	0	0	0	0	0	1	0	0	1	0
5	1	0	1	1	0	0	0	0	0	1	0	1	1	0
6	1	1	0	1	0	1	1	1	1	1	1	1	1	1
7	1	1	1	1	0	1	1	1	1	1	1	1	1	1

$\Longrightarrow f_1 = f_9; f_2; f_3 = f_4 = f_5 = f_6; f_7 = f_a; f_8$

Ausfallmatrix:

#	x_1	x_2	x_3	f_1	f_2	f_3	f_7	f_8	f
0	0	0	0	0	0	0	1	1	0
1	0	0	1	1	1	0	1	1	1
2	0	1	0	1	0	1	1	1	1
3	0	1	1	1	1	1	1	1	1
4	1	0	0	0	0	0	1	0	0
5	1	0	1	1	0	0	1	0	0
6	1	1	0	1	0	1	1	1	1
7	1	1	1	1	0	1	1	1	1

Fehlermatrix:

#	x_1	x_2	x_3	$f \nleftrightarrow f_1$	$f \nleftrightarrow f_2$	$f \nleftrightarrow f_3$	$f \nleftrightarrow f_7$	$f \nleftrightarrow f_8$	Test
0	0	0	0	0	0	0	1	1	$\star$
1	0	0	1	0	0	1	0	0	$\star$
2	0	1	0	0	1	0	0	0	$\star$
3	0	1	1	0	0	0	0	0	
4	1	0	0	0	0	0	1	0	
5	1	0	1	1	0	0	1	0	$\star$
6	1	1	0	0	1	0	0	0	
7	1	1	1	0	1	0	0	0	

$\Longrightarrow$ Testvector: $\{(0,0,0),(0,0,1),(0,1,0),(1,0,1)\}$

Exercise 5.2 (Row and Column-Rules are not a function)

todo

Exercise 6.3 (Hazards)

$x_1 = 1$				
x_2x_3 \ x_4x_5	00	01	11	10
00		1		
01		1		1
11	1	1		1
10	1	1		

which yields: $f = \neg x_1 x_2 \neg x_3 \neg x_4 + \neg x_1 \neg x_2 \neg x_3 \neg x_5 + \neg x_1 x_2 x_3 x_4 x_5 + x_1 x_2 \neg x_4 + x_1 \neg x_4 x_5 + x_1 x_3 x_4 \neg x_5$