

# GTI Aufgaben Serie 6

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## Aufgabe 1.)

- 1.) wahr
- 2.) falsch
- 3.) wahr
- 4.) .....

## Aufgabe 2.a)

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a)

$A(t)$	$B(t)$	$C(t)$	$J_A$	$K_A$	$J_B$	$K_B$	$J_C$	$K_C$	$A(t+1)$	$B(t+1)$	$C(t+1)$
0	0	0	0	0	0	0	1	0	0	0	1
0	0	1	0	0	1	0	0	1	0	1	0
0	1	0	1	0	0	1	1	0	1	0	0
0	1	1	1	0	0	1	0	0	1	0	1
1	0	0	0	1	1	0	1	0	0	1	1
1	0	1	0	0	1	0	0	1	1	1	0
1	1	0	0	1	0	1	1	0	0	0	1
1	1	1	0	1	0	1	0	0	0	0	1

**Aufgabe 2.b)**

b.)

(DNF)  $J_A = \neg A(t) B(t) \neg C(t) + A(t) B(t) C(t)$   
 $B(t)$

$A(t) \backslash B(t)$	00	01	11	10
0	0	1	0	0
1	0	1	0	0

(KNF)  $K_A = \neg A(t) + B(t) + \neg C(t)$   
 $B(t) + \neg C(t)$

$A(t) \backslash B(t)$	00	01	11	10
0	0	0	1	1
1	0	0	1	0

(KNF)  $J_B = \neg A(t) \neg B(t) C(t)$   
 $\neg A(t) + C(t)$

$A(t) \backslash B(t)$	00	01	11	10
0	0	0	0	1
1	1	0	0	1

(DNF)  $K_B = \neg A(t) B(t) \neg C(t) + \neg A(t) B(t) C(t) + A(t) B(t) \neg C(t) + A(t) B(t) C(t)$   
 $\neg A(t)$

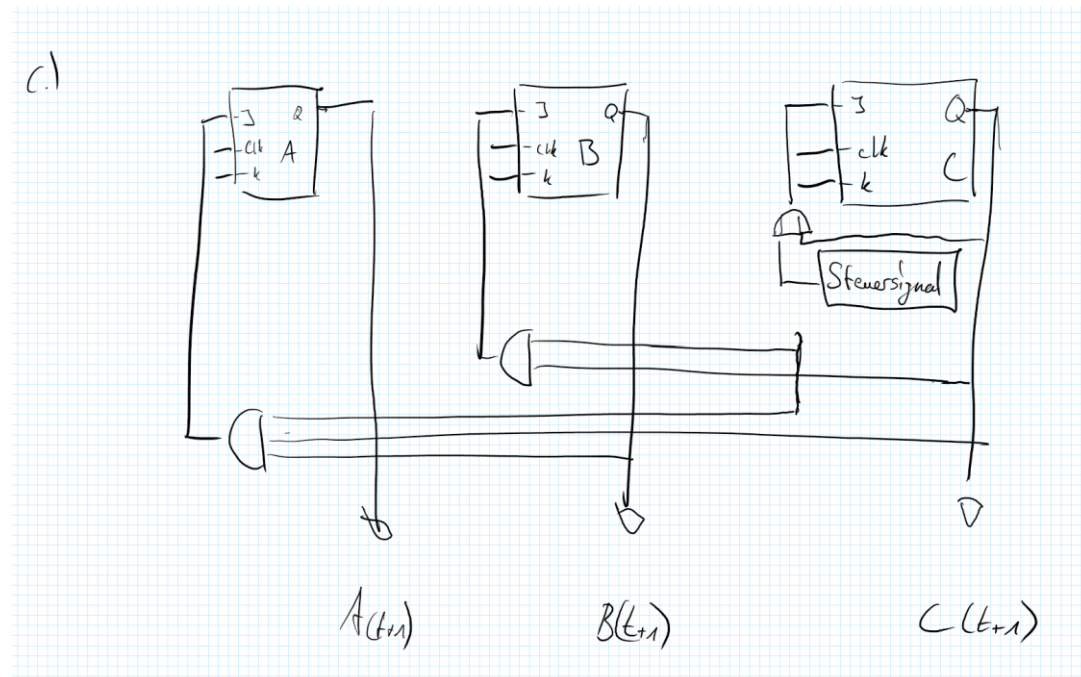
$A(t) \backslash B(t)$	00	01	11	10
0	0	1	1	0
1	0	1	1	0

$J_C = KNF = 1$   
 $\neg A(t) + B(t) = \neg C(t)$

$A(t) \backslash B(t)$	00	01	11	10
0	1	1	1	1
1	0	0	0	0

(KNF)  $K_C = \neg A(t) \neg B(t) C(t) + A(t) \neg B(t) C(t)$   
 $\neg B(t) + C(t)$

$A(t) \backslash B(t)$	00	01	11	10
0	0	0	0	0
1	1	0	0	1

**Aufgabe 2.c)**

**Aufgabe 3.a)**

Auf 3.)

$x_2(t)$	$x_1(t)$	$x_0(t)$	$x_2(t+1)$	$x_1(t+1)$	$x_0(t+1)$
0	0	0	0	0	1
0	0	1	0	1	1
0	1	0	1	1	0
0	1	1	0	1	0
1	0	0	0	0	0
1	0	1	0	0	0
1	1	0	1	0	0
1	1	1	0	0	0

**Aufgabe 3.b)**

$x_2(t+1) = \neg x_0 \neg x_1 \neg x_2 + \neg x_0 x_1 x_2$  (DNF)  
 $x_2(t) \quad x_1(t) = \neg x_0 \neg x_1 \neg x_2 + \neg x_0 x_1 x_2$

$x_0(t)$		00	01	10	11
0		0	1	0	1
1		0	0	0	0

$x_1(t+1) = x_0 \neg x_1 \neg x_2 + \neg x_0 x_1 \neg x_2 + x_0 x_1 \neg x_2$  (DNF)  
 $x_2(t) \quad x_1(t) = x_1 \neg x_2 + x_0 \neg x_2$

$x_0(t)$		00	01	10	11
0		0	1	0	0
1		1	1	0	0

$x_0(t+1) = \neg x_0 \neg x_1 \neg x_2 + x_0 \neg x_1 \neg x_2$  (DNF)  
 $x_2(t) \quad x_1(t) = \neg x_1 \neg x_2$

$x_0(t)$		00	01	10	11
0		1	0	0	0
1		1	0	0	0

## Aufgabe 4.i)

Auf 4.)

(i)

$x_2$	$x_1$	$x_0$	$y_2$	$y_1$	$y_0$
0	0	0	1	1	1
0	0	1	0	0	0
0	1	0	0	0	1
0	1	1	0	1	0
1	0	0	0	1	1
1	0	1	1	0	0
1	1	0	1	0	1
1	1	1	1	1	0

Kleiner Fehler bei  $y_2$ 

$$y_0 = \neg x_0$$

$x_1 x_2$		00	01	10	11
$x_0$	0	1	1	1	1
	1	0	0	0	0

$$y_1 = \neg x_0 \neg x_1 \neg x_2 + x_0 \neg x_1 x_2 + \neg x_0 x_1 \neg x_2 + x_0 x_1 x_2$$

$$= \neg x_0 \neg x_2 + x_0 x_2$$

$x_1 x_2$		00	01	10	11
$x_0$	0	1	0	1	0
	1	0	1	0	1

$$y_2 = \neg x_0 + x_1 x_2 + x_0 x_1$$

$x_1 x_2$		00	01	10	11
$x_0$	0	1	0	0	1
	1	0	0	1	1

(ii)

Rückwärts - Zähler

Diagram illustrating a 3-bit counter circuit (Rückwärts - Zähler) using three D flip-flops (V, S, T) and logic gates.

The circuit is clocked by a common clock signal  $T_{eff}$ .

The flip-flop outputs are  $x_0$  (from V),  $x_1$  (from S), and  $x_2$  (from T).

The logic gates are configured as follows:

- Two 3-input AND gates are used to generate the feedback signals  $y_0$  and  $y_1$ .
- The first AND gate takes inputs  $x_0$  and  $x_1$ .
- The second AND gate takes inputs  $x_0$  and  $x_2$ .
- The third AND gate takes inputs  $x_1$  and  $x_2$ .
- The outputs of the first and second AND gates are connected to the inputs of the first OR gate, which produces  $y_0$ .
- The output of the third AND gate and the output of the first OR gate are connected to the inputs of the second OR gate, which produces  $y_1$ .
- The output of the third AND gate is also connected to the input of the third OR gate, which produces  $y_2$ .

The outputs  $y_0$ ,  $y_1$ , and  $y_2$  are connected back to the D inputs of the flip-flops V, S, and T respectively, forming a feedback loop.