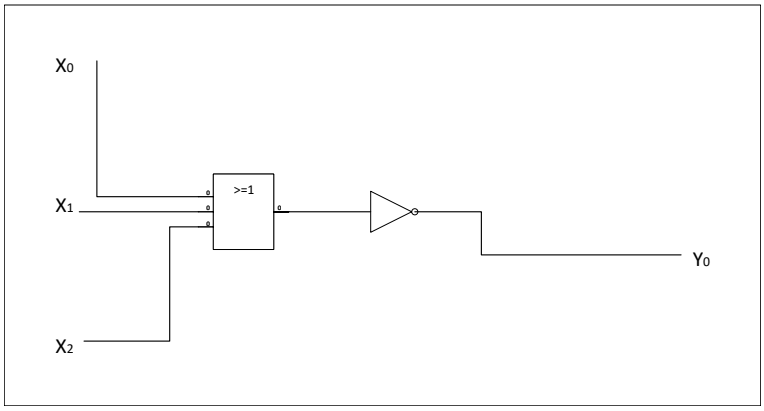
Grundlagen der Rechnerarchitektur
Übungsblatt 8

Tarik Enderes, Jonas Strauch

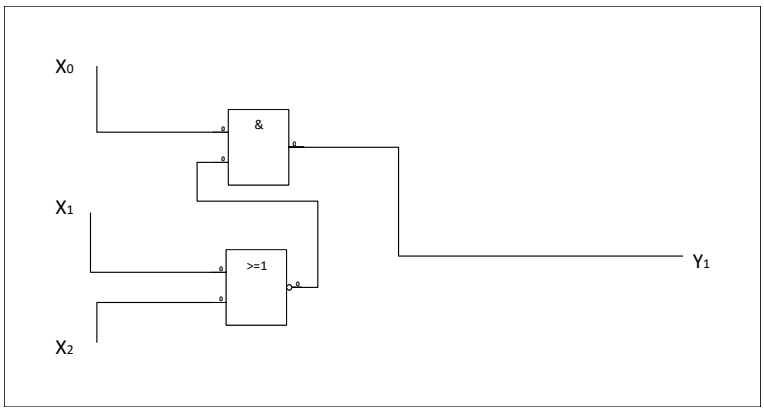
1. a)

x_2	x_1	x_0	y_7	y_6	y_5	y_4	y_3	y_2	y_1	y_0
0	0	0	0	0	0	0	0	0	0	1
0	0	1	0	0	0	0	0	0	1	0
0	1	0	0	0	0	0	0	1	0	0
0	1	1	0	0	0	0	1	0	0	0
1	0	0	0	0	0	1	0	0	0	0
1	0	1	0	0	1	0	0	0	0	0
1	1	0	0	1	0	0	0	0	0	0
1	1	1	1	0	0	0	0	0	0	0

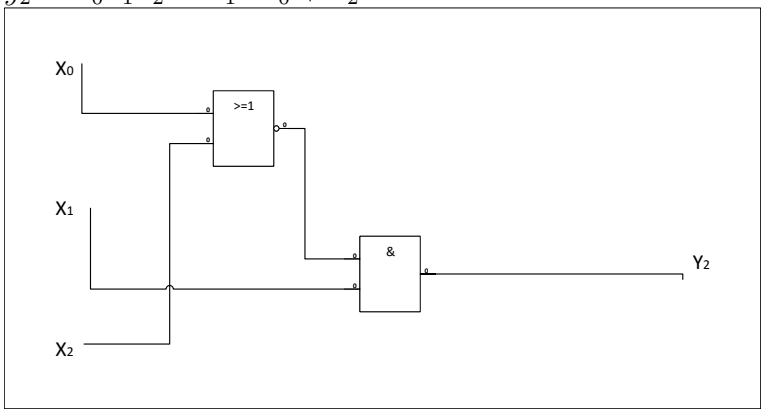
b) $y_0 = \overline{x_0}\,\overline{x_1}\,\overline{x_2} = \overline{x_0 + x_1 + x_2}$



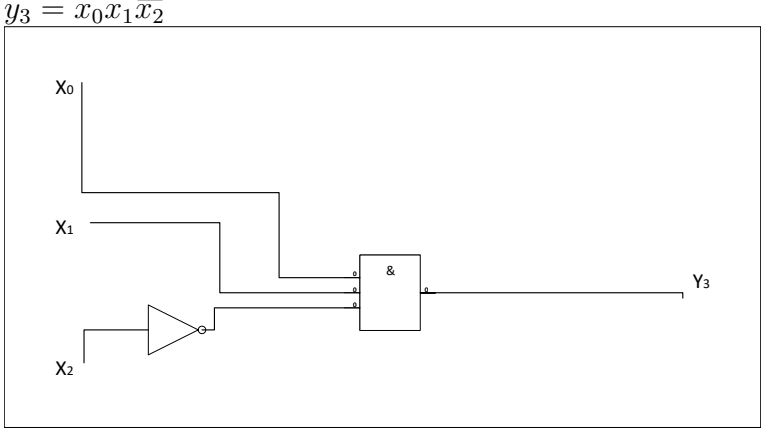
$y_1 = x_0\overline{x_1}\,\overline{x_2} = x_0 \cdot \overline{x_1 + x_2}$



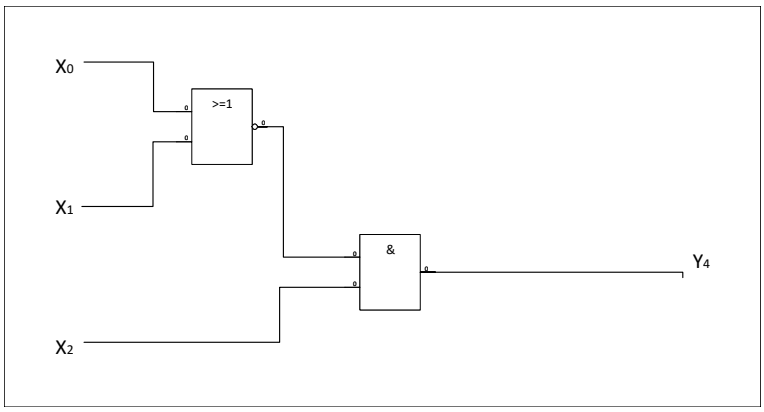
$y_2 = \overline{x_0} x_1 \overline{x_2} = x_1 \cdot \overline{x_0 + x_2}$



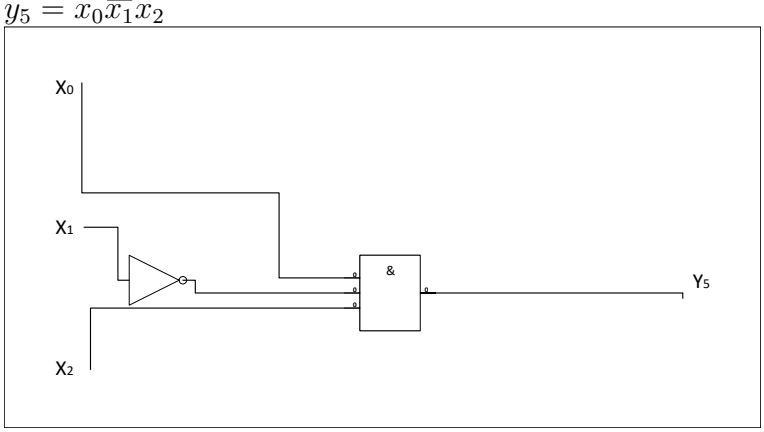
$y_3 = x_0 x_1 \overline{x_2}$



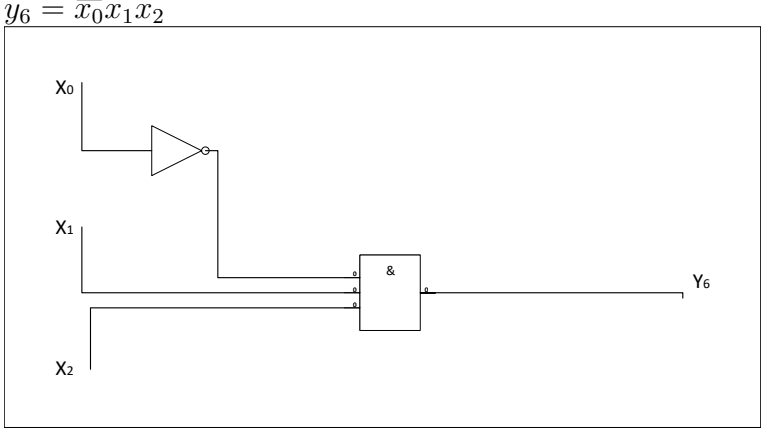
$y_4 = \overline{x_0}\,\overline{x_1} x_2 = x_2 \cdot \overline{x_0 + x_1}$



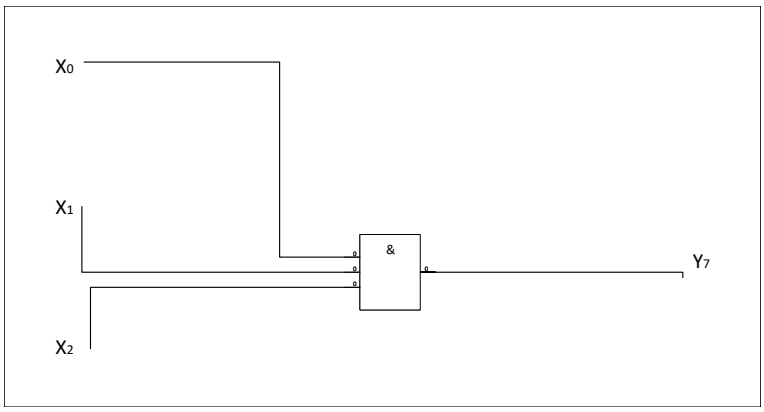
$y_5 = x_0\overline{x_1}x_2$



$y_6 = \overline{x_0}x_1x_2$



$y_7 = x_0x_1x_2$



2. a)

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

3. a)

d	x_3	x_2	x_1	x_0	y_3	y_2	y_1	y_0
0	0	0	0	0	0	0	0	0
1	0	0	0	1	0	0	0	1
2	0	0	1	0	0	0	1	0
3	0	0	1	1	0	0	1	1
4	0	1	0	0	0	1	0	0
5	0	1	0	1	1	0	1	1
6	0	1	1	0	1	1	0	0
7	0	1	1	1	1	1	0	1
8	1	0	0	0	1	1	1	0
9	1	0	0	1	1	1	1	1

Für die Darstellung von Zahlen größer als neun werden acht Bit benötigt.

b) $y_0 = x_0\overline{x_1}\overline{x_2}\overline{x_3} + x_0x_1\overline{x_2}\overline{x_3} + x_0\overline{x_1}x_2\overline{x_3} + x_0x_1x_2\overline{x_3} + x_0\overline{x_1}\overline{x_2}x_3$

$y_1 = \overline{x_0}x_1\overline{x_2}\overline{x_3} + x_0x_1\overline{x_2}\overline{x_3} + x_0\overline{x_1}x_2\overline{x_3} + \overline{x_0}\overline{x_1}\overline{x_2}x_3 + x_0\overline{x_1}\overline{x_2}x_3$

$y_2 = \overline{x_0}\overline{x_1}x_2\overline{x_3} + \overline{x_0}x_1x_2\overline{x_3} + x_0x_1x_2\overline{x_3} + \overline{x_0}\overline{x_1}\overline{x_2}x_3 + x_0\overline{x_1}\overline{x_2}x_3$

$y_3 = x_0\overline{x_1}x_2\overline{x_3} + \overline{x_0}x_1x_2\overline{x_3} + x_0x_1x_2\overline{x_3} + \overline{x_0}\overline{x_1}\overline{x_2}x_3 + x_0\overline{x_1}\overline{x_2}x_3$

c) $y_0 = x_0$

	$\overline{x_0}$	x_0	x_0	$\overline{x_0}$	
$\overline{x_1}$	0	0	1	0	$\overline{x_3}$
x_1	1	1	0	0	$\overline{x_3}$
x_1	1	1	1	1	x_3
$\overline{x_1}$	1	1	1	1	x_3
	$\overline{x_2}$	$\overline{x_2}$	x_2	x_2	

$\implies y_1 = x_1\overline{x_2}\overline{x_3} + x_0\overline{x_1}x_2 + x_3$

	$\overline{x_0}$	x_0	x_0	$\overline{x_0}$	
$\overline{x_1}$	0	0	0	0	$\overline{x_3}$
x_1	1	0	1	1	$\overline{x_3}$
x_1	1	1	1	1	x_3
$\overline{x_1}$	1	1	1	1	x_3
	$\overline{x_2}$	$\overline{x_2}$	x_2	x_2	

$\implies y_2 = \overline{x_0}x_1\overline{x_3} + x_1x_2\overline{x_3} + x_3$

	$\overline{x_0}$	x_0	x_0	$\overline{x_0}$	
$\overline{x_1}$	0	0	1	1	$\overline{x_3}$
x_1	1	0	1	1	$\overline{x_3}$
x_1	1	1	1	1	x_3
$\overline{x_1}$	1	1	1	1	x_3
	$\overline{x_2}$	$\overline{x_2}$	x_2	x_2	

$\implies y_3 = \overline{x_0}x_1\overline{x_3} + x_2 + x_3$