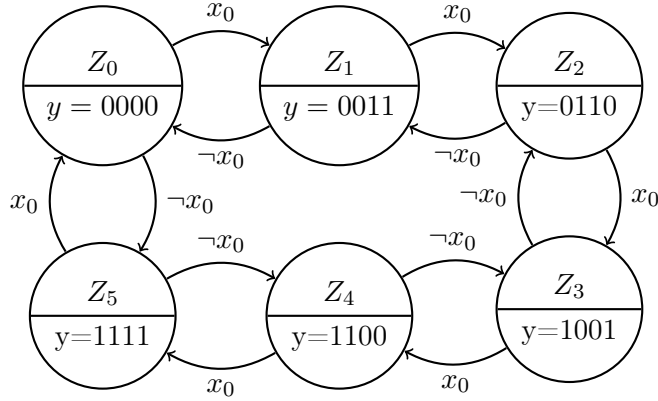


### Aufgabe3.1

Die Schaltung soll einen Zähler darstellen der in 3er Schritten vorwärts oder rückwärts zählt. Das Umstellen der Zählrichtung erfolgt durch den Schalter  $x_0$ .



$A = \{X, Y, Z, \delta, \mu\}$ , mit

$X: B \Rightarrow \{x_0\}$

$Y: B^4 \Rightarrow \{y_3, y_2, y_1, y_0\}$

$Z: B^6 \Rightarrow \{Z_5, Z_4, Z_3, Z_2, Z_1, Z_0\}$ , mit

$ON(Z_0) = \{0000\}$

$ON(Z_1) = \{0011\}$

$ON(Z_2) = \{0110\}$

$ON(Z_3) = \{1001\}$

$ON(Z_4) = \{1100\}$

$ON(Z_5) = \{1111\}$

$\delta: B^3 \Rightarrow \{z_2^+, z_1^+, z_0^+\}$

Für die Zustandsübergangsfunktion gilt

$z_2^+ = (x_0 \wedge \neg z_2 \wedge z_1 \wedge \neg z_0) \vee (\neg x_0 \wedge z_1 \wedge z_0) \vee (x_0 \wedge z_2 \wedge \neg z_0)$

$z_1^+ = (\neg x_0 \wedge \neg z_2 \wedge \neg z_1 \wedge z_0) \vee (\neg x_0 \wedge z_1 \wedge \neg z_0) \vee (x_0 \wedge \neg z_2 \wedge \neg z_1)$

$z_0^+ = \neg z_0$

$\mu: B^4 \Rightarrow \{y_3, y_2, y_1, y_0\}$ , mit

$y_3 = z_2 \vee (z_1 \wedge z_0)$

$y_2 = z_2 \vee z_1 \wedge z_0$

$y_1 = \neg z_1 \wedge \neg z_0 \vee z_1 \wedge \neg z_0$

$y_0 = z_0$

Dazu die Wertetabelle

$x_0$	$Z$	$z_2$	$z_1$	$z_0$	$y_3$	$y_2$	$y_1$	$y_0$	$Z^+$	$z_2^+$	$z_1^+$	$z_0^+$
0	$Z_0$	0	0	0	0	0	0	0	$Z_1$	0	0	1
0	$Z_1$	0	0	1	0	0	1	1	$Z_2$	0	1	0
0	$Z_2$	0	1	0	0	1	1	0	$Z_3$	0	1	1
0	$Z_3$	0	1	1	1	0	0	1	$Z_4$	1	0	0
0	$Z_4$	1	0	0	1	1	0	0	$Z_5$	1	0	1
0	$Z_5$	1	0	1	1	1	1	1	$Z_0$	0	0	0
0	—	1	1	0	*	*	*	*	—	*	*	*
0	—	1	1	1	*	*	*	*	—	*	*	*
1	$Z_0$	0	0	0	0	0	0	0	$Z_5$	1	0	1
1	$Z_1$	0	0	1	0	0	1	1	$Z_0$	0	0	0
1	$Z_2$	0	1	0	0	1	1	0	$Z_1$	0	0	1
1	$Z_3$	0	1	1	1	0	0	1	$Z_2$	0	1	0
1	$Z_4$	1	0	0	1	1	0	0	$Z_3$	0	1	1
1	$Z_5$	1	0	1	1	1	1	1	$Z_4$	1	0	0
1	—	1	1	0	*	*	*	*	—	*	*	*
1	—	1	1	1	*	*	*	*	—	*	*	*

Daraus ergeben sich folgende KV-Diagramme für  $z_2^+$ ,  $z_1^+$  und  $z_0^+$ .

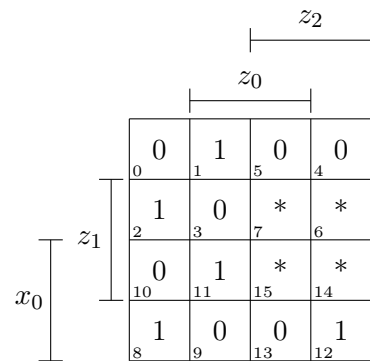
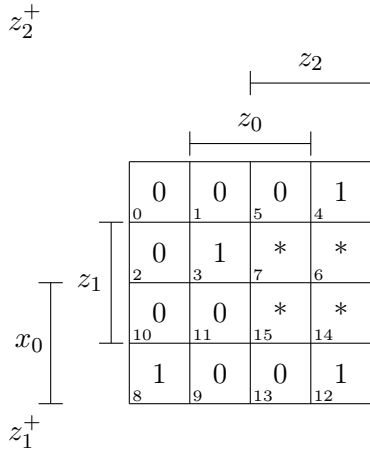


Diagram illustrating a 2D lattice structure with indices  $z_0$  and  $z_1$ . The lattice is represented by a grid of points, with the horizontal distance between columns labeled  $z_0$  and the vertical distance between rows labeled  $z_1$ . The total horizontal distance is labeled  $z_2$ . The grid contains the following values:

1	0	0	1
1	0	*	*
1	0	*	*
1	0	0	1

The indices for the grid points are labeled as follows:

- Row 0: 0, 1, 5, 4
- Row 1: 2, 3, 7, 6
- Row 2: 10, 11, 15, 14
- Row 3: 8, 9, 13, 12

 $y_3$ 

The diagram shows a 2D array with four columns and two rows. The columns are indexed 0, 1, 5, and 4 from left to right. The rows are indexed 0 and 2 from top to bottom. The array contains the following values:

0	0	1	1
0	1	*	*

Dimensions and indices are indicated by brackets and labels:

- $z_0$  is the width of the array (4 columns).
- $z_2$  is the height of the array (2 rows).
- $z_1$  is the index of the first row (0).
- $z_2$  is the index of the second row (2).

Figure 1 shows a 2D lattice with a grid of values. The horizontal axis is labeled  $z_0$  and the vertical axis is labeled  $z_1$ . The grid contains the following values:

	0	0	1	1
$z_1$	1	0	*	*

Indices 0, 1, 5, 4 are positioned above the top row, and indices 2, 3, 7, 6 are positioned below the bottom row.

Diagram illustrating a 2D lattice structure with axes  $z_0$  and  $z_1$ . The lattice points are labeled with values and indices:

	0	1	1	0
$z_1$	1	0	*	*

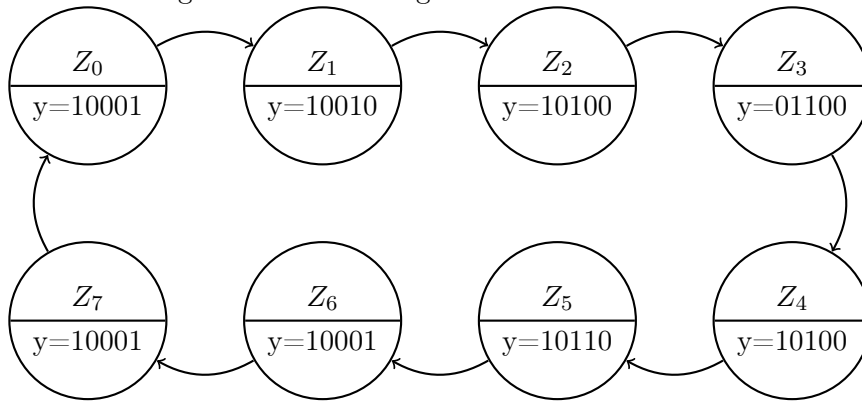
Indices (0, 1, 5, 4) are associated with the top row, and indices (2, 3, 7, 6) are associated with the bottom row.

3

				$z_2$			
				$z_0$			
				0	1	1	0
				5	4		
$z_1$				0	1	*	*
				2	3	7	6

### Aufgabe 3.2

In dieser Aufgabe soll eine Ampel implementiert werden die Automatisch läuft. Heißt nach einer gewissen Zeit gibt es Automatisch grün die Fußgänger ohne das ein Knopf gedrückt werden muss. Es ist also ein Autonomer-Automat. Folglich beschreibt folgender Automat die Funktion der Ampel.



$x_0$	Z	$z_2$	$z_1$	$z_0$	$z_2^+$	$z_1^+$	$z_0^+$	$J_2$	$K_2$	$J_1$	$K_1$	$J_0$	$K_0$	$y_4$	$y_3$	$y_2$	$y_1$	$y_0$
0	$Z_0$	0	0	0	0	0	1	0	*	0	*	1	*	1	0	0	0	1
0	$Z_1$	0	0	1	0	1	0	0	*	1	*	*	1	1	0	0	1	0
0	$Z_2$	0	1	0	0	1	1	0	*	*	0	1	*	1	0	1	0	0
0	$Z_3$	0	1	1	1	0	0	1	*	*	1	*	1	0	1	1	0	0
0	$Z_4$	1	0	0	1	0	1	*	0	0	*	1	*	1	0	1	0	0
0	$Z_5$	1	0	1	1	1	0	*	0	1	*	*	1	1	0	1	1	0
0	$Z_6$	1	1	0	1	1	1	*	0	*	0	1	*	1	0	0	0	1
0	$Z_7$	1	1	1	0	0	0	*	1	*	1	*	1	1	0	0	0	1