

Lösungen Blatt 8

1.) a) $\begin{matrix} & & & & & & & & & & X \\ & 3 & 2 & 8 & 2 & 8 & 7 & 1 & 4 & 4 & 10 \\ g. & 10 & 9 & 8 & 7 & 6 & 5 & 4 & 3 & 2 & 1 \\ & 8 & 7 & 9 & 3 & 4 & 2 & 4 & 1 & 8 & 10 \end{matrix}$

$$\Sigma = 56 = 1 \pmod{11}$$

Als Summe müsste sich 0 ergeben.

Also kein Codewort

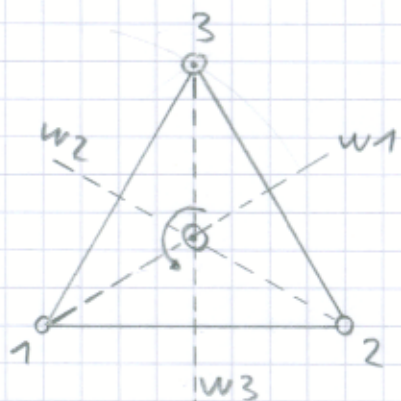
b) $\begin{matrix} & 3 & 5 & 2 & 8 & 0 & 6 & 7 & 8 & 3 & \square \\ g & 10 & 9 & 8 & 7 & 6 & 5 & 4 & 3 & 2 & 1 \\ & 8 & 1 & 5 & 1 & 0 & 8 & 6 & 2 & 6 & \end{matrix}$

$$\Sigma = 37 = 4 \pmod{11}$$

$$4 + \square \cdot 1 = 0$$

$$\square = -4 = \underline{\underline{7}} \pmod{11}$$

2.)



Symmetrien:

id

w1, w2, w3 Spiegelungen

120, 240 Drehungen

\circ	id	w1	w2	w3	120	240
id	id	w1	w2	w3	120	240
w1	w1	id	120	240	w2	w3*
w2	w2	240	id	120	w3	w1
w3	w3	120	240	id	w1	w2
120	120	w3	w1	w2	240	id
240	240	w2	w3	w1	id	120

$$\begin{aligned} \gamma \quad w1 \circ 240 &= w3 \\ 1 &\rightarrow 2 \\ 2 &\rightarrow 1 \\ 3 &\rightarrow 3 \end{aligned}$$

$$a) \quad w_3, 120, w_3, w_1, 240, w_1, \square$$

$$w_3 \circ 120 \circ w_3 \circ w_1 \circ 240 \circ w_1 = \text{id}$$

van links:

$$w_3 \circ 120 = w_1$$

$$w_1 \circ w_3 = 240$$

$$240 \circ w_1 = w_2$$

$$w_2 \circ 240 = w_1$$

$$w_1 \circ w_1 = \text{id}$$

van rechts:

$$240 \circ w_1 = w_2$$

$$w_1 \circ w_2 = 120$$

$$w_3 \circ 120 = w_1$$

$$120 \circ w_1 = w_3$$

$$w_3 \circ w_3 = \text{id} \quad \checkmark$$

$$\text{id} \circ \square = \text{Kontrollsymbol } 120$$

$$\Rightarrow \square = 120$$

$$b) \quad \pi_1: \begin{array}{cccccc} \text{id} & w_1 & w_2 & w_3 & 120 & 240 \\ \downarrow & \downarrow & \downarrow & \downarrow & \downarrow & \downarrow \\ w_1 & 120 & w_2 & 240 & w_3 & \text{id} \end{array}$$

$$\pi_2: \begin{array}{cccccc} \text{id} & w_1 & w_2 & w_3 & 120 & 240 \\ \downarrow & \downarrow & \downarrow & \downarrow & \downarrow & \downarrow \\ 120 & w_3 & w_2 & \text{id} & 240 & w_1 \end{array}$$

$$\pi_3: \begin{array}{cccccc} \text{id} & w_1 & w_2 & w_3 & 120 & 240 \\ \downarrow & \downarrow & \downarrow & \downarrow & \downarrow & \downarrow \\ w_3 & 240 & w_2 & w_1 & \text{id} & 120 \end{array}$$

$$\pi_4: \begin{array}{cccccc} \text{id} & w_1 & w_2 & w_3 & 120 & 240 \\ \downarrow & \downarrow & \downarrow & \downarrow & \downarrow & \downarrow \\ 240 & \text{id} & w_2 & 120 & w_1 & w_3 \end{array}$$

Eigenschappen $w_1, 120, w_3, \square$

$$\pi_1(w_1) \circ \pi_2(120) \circ \pi_3(w_3) \circ \pi_4(\square) = 120 \quad \text{Kontrollsymbol}$$

$$120 \circ 240 \circ w_1 \circ \pi_4(\square) = 120$$

$$w_1 \circ \pi_4(\square) = 120$$

$$\Rightarrow \pi_4(\square) = w_2 \quad \Rightarrow \square = w_2$$