LMU LUDWIG-MAXIMILIANS-UNIVERSITÄT MÜNCHEN
MATHEMATISCHES INSTITUT

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Lineare Algebra I – Tutoriumsblatt 03

Aufgabe 1.
Let X be a set. Recall that each partition $\rho \subset \mathcal{P}(X)$ defines an equivalence relation on X: $R_\rho = \{(x, y) \in X \times X \mid \exists Y \in \rho : \ x, y \in Y\}$. Prove that $\rho \mapsto R_\rho$ defines a bijection between the set of partitions of X and the set of equivalence relations on X.

Aufgabe 2.
Let A be an infinite subset of $\mathbb{N}$. Using induction, construct a bijection between $\mathbb{N}$ and A.

Aufgabe 3.
Using induction, compute the sum of angles of an n-gon (without self-intersections).

Aufgabe 4.

1. Let $(G, \cdot)$ be a group. Prove that $e^{-1} = e$ and that for any $g \in G$ holds $(g^{-1})^{-1} = g$.
2. Let G be a set, $\cdot : G \times G \to G$ an assotiative operation on G, and assume that
   - $\exists\, e \in G$ such that $\forall g \in G$ holds $g \cdot e = g$;
   - $\forall g \in G\ \exists\, h \in G$ such that $g \cdot h = e$.

   Prove that G is a group.