INTRODUCTORY LECTURE

We begin with the abstract definition of a group;

Definition 0.0.1. *A* group *is an ordered pair* (G, μ)*, where* G *is a set and* $\mu : G \times G \to G$ *is a binary operation, satisfying the following axioms:*

(1) (associativity) $\mu(\mu(a, b), c) = \mu(a, \mu(b, c))$ *for any* $a, b, c \in G$
(2) (identity) there exists $e \in G$ *such that for any* $a \in G$ *we have* $\mu(a, e) = \mu(e, a) = a$
(3) (inverses) for any $a \in G$*, there is an element* $a^{-1} \in G$ *such that* $\mu(a, a^{-1}) = \mu(a^{-1}, a) = e$*.*

Here is a simple first example of a group:

Example 0.0.2 (the integers)**.** *Let* $\mathbb{Z}$ *denote*

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