

Abstract Algebra 2024–I

Homework 2

Christian Chávez

February 18, 2024

1. Determine which of the following binary operations are associative.
 - (a) the operation \star on \mathbb{Z} defined by $a \star b = a - b$
 - (b) the operation \star on \mathbb{R} defined by $a \star b = a + b + ab$
 - (c) the operation \star on \mathbb{Q} defined by $a \star b = \frac{a+b}{5}$
 - (d) the operation \star on $\mathbb{Z} \times \mathbb{Z}$ defined by $(a, b) \star (c, d) = (ad + bc, bd)$
 - (e) the operation \star on $\mathbb{Q} \setminus \{0\}$ defined by $a \star b = \frac{a}{b}$
2. Prove that addition of residue classes in $\mathbb{Z}/n\mathbb{Z}$ is associative. (Assume it is well defined.)