

Homework Assignment # 7

DUE: Thursday, April 2, at 5:00pm in Moodle.

The numbered exercises refer to the manuscript *Mathematical Structures*. Always justify all assertions.

1. Consider the relation R on \mathbb{Z} defined below. Decide (with proof) if it is an equivalence relation? If so, find all the distinct equivalence classes of R and give at least four elements of each equivalence class.

$$xRy \text{ if and only if } x^2 - y^2 \text{ is a multiple of } 5.$$

2. Exercise 4.3
3. Exercise 5.1
4. Exercise 5.9
5. Exercise 5.13
6. Repeat Exercise 5.13 using the set $\mathbb{Z}/6\mathbb{Z} = \{0, 1, 2, 3, 4, 5\}$, with “multiplication operation” defined by $a \cdot b =$ the remainder of the ordinary product ab on division by 6. Which elements have inverses under this multiplication operation?
7. Exercise 5.14