

# Infinity I Homework

Advanced 1

January 28, 2020

**Problem 1.**

Let  $A = \{1, 2, 3\}$ ,  $B = \{a, b, c, d\}$ ,  $C = \{x, y, z\}$ .

1. How many functions are there from  $A$  to  $B$ ? From  $A$  to  $C$ ?
2. How many bijections are there from  $A$  to  $B$ ? From  $A$  to  $C$ ?
3. How many bijections are there between two sets with  $n$  elements each?

**Problem 2.**

Let  $A$  be a set with  $n \geq 1$  elements. Prove that there are as many subsets of  $A$  with even number of elements, as there are with odd number of elements. *Hint:* Construct a bijection.

**Problem 3.**

Construct a bijection between the set of natural numbers and nonnegative integers that have remainder 0, 1 or 2 when divided by 100:  $\{0, 1, 2, 100, 101, 102, 200, 201, 202, \dots\}$ .