Contents

0.1 Rational numbers

0.1.1 Defining rational numbers

We previously defined integers in terms of natural numbers. Similarly we can define rational numbers in terms of integers.

$\forall ab \in \mathbb{I}(\neg(b = 0) \rightarrow \exists c(b.c = a))$

A rational is an ordered pair of integers.

$\{\{a\}, \{a, b\}\}$

So that:

$\{\{a\}, \{a, b\}\} = \frac{a}{b}$

0.1.2 Converting integers to rational numbers

Integers can be shown as rational numbers using:

$(i, 1)$

Integers can then be turned into rational numbers:

$\mathbb{Q} = \frac{a}{1}$

$a = \frac{a_1}{a_2}$

$b = \frac{b_1}{b_2}$

$c = \frac{c_1}{c_2}$

0.1.3 Equivalence classes of rationals

There are an infinite number of ways to write any rational number, as with integers. $\frac{1}{2}$ can be written as $\frac{1}{2}$, $\frac{-2}{-4}$ etc.

The class of these terms form an equivalence class.

We can show these are equal:

$\frac{a}{b} = \{\{a\}, \{a, b\}\}$

$\frac{ca}{cb} = \{\{a\}, \{a, b\}\}$

$\frac{ca}{cb} = \{\{ca\}, \{ca, cb\}\}$

$\{\{a\}, \{a, b\}\} = \{\{ca\}, \{ca, cb\}\}$