

Foundations of mathematics – week 11

December 18, 2009

Exercises

1. What is the cardinality of the set of all functions from \mathbb{N} to \mathbb{N} ?
2. What is the cardinality of the set of all non-increasing functions from \mathbb{N} to \mathbb{N} ?
3. What is the cardinality of the set of all non-decreasing functions from \mathbb{N} to \mathbb{N} ?
4. Find the cardinality of the set of all continuous functions from \mathbb{R} to \mathbb{R} .
5. Find the cardinality of the set of all equivalence relations in \mathbb{N} .
6. Which of the following sets are equinumerous:

$$\mathbb{Z}, \mathbb{R}^{\mathbb{N}}, \mathbb{Q}^{\mathbb{N}}, \mathbb{R} \times \mathbb{R}, \{0, 1\}^*, \{0, 1\}^{\mathbb{N}}, P(\mathbb{Q}), P(\mathbb{R})?$$

Homework

1. Find the cardinality of the set of the sequences of rational number which converge to zero.
2. Find the cardinality of the set of all equivalence relations in \mathbb{N} which have finitely many equivalence classes.
3. Which of the following sets are equinumerous:

$$\mathbb{Q} \times \mathbb{Z}, \mathbb{R} \times \mathbb{Q}, \mathbb{R} - \mathbb{Q}, 2^{\mathbb{N}}, 2^{\mathbb{R}}, P(\mathbb{R} \times \mathbb{Z}), \bigcup_{m \in \mathbb{N}} \mathbb{N}^m?$$

4. (*) Find the cardinality of the Cantor set.