

Class 9: Cardinality

Schedule

This week you should finish reading MSC Chapter 4 (section 4.5) and Section 5.1.

Problem Set 4 is due **Friday at 6:29pm**.

Relation Practice

The *inverse* of a relation $R : A \rightarrow B, G \subseteq A \times B$ is defined by reversing all the arrows:

$$R^{-1} : B \rightarrow A, G^{-1} \subseteq B \times A$$

$$(b, a) \in G^{-1} \iff \underline{\hspace{2cm}}$$

What does it mean if $R \equiv R^{-1}$?

Set Cardinality

Finite Cardinality. If A is a finite set, the *cardinality* of A , written $|A|$, is the number of elements in A .

Does this definition require adding a new fundamental set operation?

Alternate definition: The *cardinality* of the set

$$N_k = \{n \mid n \in \mathbb{N} \wedge n < k\}$$

is k . If there is a *bijection* between two sets, they have the same cardinality.

Making Power Sets

The **power set** of A ($\text{pow}(A)$) is the set of all subsets of A :

$$B \in \text{pow}(A) \iff B \subseteq A.$$

Prove that the size of the power set of a set S with $|S| = N$ is 2^N .

