Lecture 4

Lemma: $|A| \leq |B|$ and $|B| \leq |A|$ implies $|A| = |B|$.
some countable sets

> finite length strings
> computer programs
> all finite cardinality sets of integers
> all rationals

Larger sets

> $f : \{1, 2, 3, \ldots\} \to \{0, 1\}$
> all sets of integers

Diagonalization over all computable functions
Halting problem not computable
There exists a theorem that is true but has no proof
Between every pairs of rationals there is a real and between every pair of reals there is a rational.