ETH zürich

Discrete Mathematics **2024**

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Assignment 6

Due date: Thursday, 31 October 2024, 23:59

Exercise 6.5, Countability (8 Points)

Prove that for all $l \in \mathbb{N}$ with $l \geq 1$ the set

$$A_l \coloneqq \left\{ f : \mathbb{N} \to \{0,1\} \middle| \sum_{i=0}^{k} f(i) \leq \frac{k}{l} + 1 \quad \forall k \in \mathbb{N} \right\}.$$

is uncountable.
Hint: For all $l \geq 1$, explicitly write an injection from a known uncountable set into A_l.