

Definition 0.1. A set A is *infinite* if there is an injection $f : A \rightarrow A$ that is not also a surjection.

1.) Prove that $Square = \{x \in \mathbb{N} \mid \exists y \in \mathbb{N}. x = y^2\}$ is an infinite set.

Definition 0.2. A set A is *finite* if there is some $k \in \mathbb{N}$ such that $|A| = |\{0..k\}|$ where $\{0..k\}$ is the initial proper prefix of the natural numbers $\{y \in \mathbb{N} \mid 0 \leq y < k\}$. In this case, we write $|A| = k$.

2.) Recalling that $|A \times A| = |A| \cdot |A|$, argue that if $A \times A$ is finite then A is.