# Proof Portfolio

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**Theorem 1.** *Let $A$ and $B$ be two sets and let $f : A \to B$ be a function. If $|A| > |B|$ then $f$ is not injective (one-to-one).*

*Proof.* We prove the contrapositive. For two nonempty finite set A and B, suppose that $f : A \to B$ is injective. Then different elements of $A$ must have different images in $B$. Therefore, if $A$ has $n$ elements, then the elements of $A$ have $n$ images in $B$. Consequently, the set $B$ must contain at least $n$ elements. Therefore, if $f : A \to B$ is injective, then $|A| \leq |B|$. ■