# Well Ordering Principle

Every non-empty subset $S \subseteq \mathbb{N} \cup \{0\}$ contains a least element
$\forall_{S \subseteq \mathbb{N} \cup \{0\},\ |S| \neq 0}\ \exists_{x \in S}\ \forall_{y \in S,\ y \neq x}\ x < y$
From my understanding this is only considering to the infinite $\mathbb{N} \cup \{0\}$ set in terms of special sets (i.e. $\mathbb{N}$, $\mathbb{Z}$, $\ldots$). In terms of non-empty finite sets (i.e. $\{-1, 0, 1\}$) and infinite sets like $A = \{-1, 0, 1, \ldots\}$, there always exist a least element. To show why this works, let $\mathbb{N} \cup \{0\} = \{0, 1, 2, \ldots\}$ and let $S$ represent all the special sets except $\mathbb{N}$. We can clearly define the least number within set $\mathbb{N} \cup \{0\}$ as 0 as opposed to $S$ where they contain infinite negative numbers. Since we know that there exist a least element in $\mathbb{N} \cup \{0\}$ then any non-empty subset of $\mathbb{N} \cup \{0\}$ will contain a least element as it cannot contain any element $< 0$. In other words, there won't be an infinite amount of least numbers, thus there will be a least element in the set (if that makes more sense).