Least greatest proofs
Prove or disprove: There is a least prime number.
Prove or disprove: There is a greatest integer.  Approach 1, De Morgan's and universal generalization:
Approach 2, proof by contradiction:
Extra examples: Prove or disprove that $\mathbb{N}$ , $\mathbb{Q}$ each have a least and a greatest element. Prove that there no greatest prime number.