Every Real Number Has a Unique Predecessor

By Jim Rock

Abstract: We explain why every real number has a unique predecessor.

Introduction. For all real numbers $a$ in the open interval $(b, c)$
let the collection of all $R_a = \{ y \text{ a real number} \mid b \leq y < a \}$

Each set in the collection of $R_a$ has a largest element.
Select a single $R_a$ taken from the collection of all $R_a$.
Along with itself this selected $R_a$ has a group of proper subsets taken from the collection of all $R_a$. This group of proper subsets are nested within each other. When nested within the selected $R_a$, this group of proper subsets forms a proper subset of the selected $R_a$.
For any two elements of the selected $R_a$ the smaller element will be in a proper subset of the selected $R_a$.
Thus, each $R_a$ must contain a single largest element not in the group of its nested proper subsets taken from the collection of all $R_a$. That unique largest element is the immediate predecessor of $a$.

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