Orderings

To order a set is to establish a relation of *precedence* between members of the set.

When I order my family members by birth date, for example, I take family member a to *precede* family member b (in symbols: $a < b$) if and only if a was born before b.

In general, we will say that a precedence relation $<$ counts as an **ordering** of a set A if it satisfies the following two conditions for any a, b, c in A:

Anti-Symmetry
If $a < b$, then $b \not< a$.

Transitivity
If $a < b$ and $b < c$, then $a < c$.

These conditions are to some extent implicit in our informal notion of precedence: I don't precede those who precede me (Anti-Symmetry), and I am preceded by those who precede my predecessors (Transitivity).

Taken together, our two conditions rule out precedence loops. For example, if a group of people are sitting around a table, Anti-Symmetry and Transitivity rule out an ordering where everyone precedes the person to their left.

Problem 1

1/1 point (ungraded)

Consider the following condition:

Anti-Reflexivity

$a \not< a.$

Does the Anti-Symmetry condition above entail Anti-Reflexivity?

- (selected) Yes
- No

Explanation

Yes. Anti-Symmetry entails Anti-Reflexivity.

Suppose that $a < a$. Then by anti-symmetry, we also have $a \not< a$, which is a contradiction. So it can't be the case that $a < a$.

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Answers are displayed within the problem