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strict betweenness relation

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1 Definition

A *strict betweenness relation* is a betweenness relation that satisfies the following axioms:

- $O2'$ $(p, q, p) \notin B$ for *each* pair of points p and q .
- $O3'$ for each $p, q \in A$ such that $p \neq q$, there is an $r \in A$ such that $(p, q, r) \in B$.
- $O4'$ for each $p, q \in A$ such that $p \neq q$, there is an $r \in A$ such that $(p, r, q) \in B$.
- $O5'$ if $(p, q, r) \in B$, then $(q, p, r) \notin B$.

2 Remarks

- A very simple example of a strict betweenness relation is the empty set. In \emptyset , all the conditions are vacuously satisfied. The empty set, in this context, is called the trivial strict betweenness relation.
- Any strict betweenness relation can be enlarged to a betweenness relation by including all triples of the forms (p, p, q) , (p, q, p) , or (p, q, q) .
- Conversely, any betweenness relation can be reduced to a strict betweenness relation by removing all triples of the forms just listed. However, it is possible that the “derived” strict betweenness relation is trivial.
- From axiom $O2'$ we have $(p, p, p) \notin B$.