Why

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Definition

An *ordering* of an undirected graph is an ordering (see Sequences) of its vertices. An *ordered undirected graph* is an ordered pair $((V, E), \sigma : \{1, 2, \ldots, |V|\} \to V)$ where (V, E) is an undirected graph (see Undirected Graphs) and σ is an ordering of the vertex set V.

Notation

Let $((V, E), \sigma)$ be an ordered undirected graph. We commonly associate it with (V, E, σ) and call this ordered triple an undirected graph as well. But, throughout these sheets, an ordered undirected graph is an ordered pair.

We denote that $\sigma^{-1}(v) < \sigma^{-1}(w)$ by $v \prec_\sigma w$ and $v \preceq_\sigma w$ by $\sigma^{-1}(v) \leq \sigma^{-1}(w)$. We occasionally omit the subscripts in $\prec_\sigma$ and $\preceq_\sigma$ when clear from context.

Visualization

We visualize an ordered undirected graph by labeling its nodes with the indices of each vertex. Let (V, E) be an undirected

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[1]Future editions will include. This sheet is needed, for example, in discussing perfect elimination orderings.
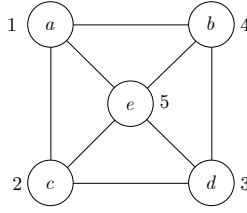
Figure 1: Ordered undirected graph.

graph with $V = \{a, b, c, d, e\}$ and

$$E = \{\{a, b\}, \{a, c\}, \{a, e\}, \{b, d\}, \{b, e\}, \{c, d\}, \{c, e\}, \{d, e\}\}.$$

Let $\sigma : \{1, \ldots, 5\} \to V$ be an ordering with

$$\sigma(1) = a \quad \sigma(2) = c \quad \sigma(3) = d \quad \sigma(4) = b \quad \sigma(e) = 5.$$

We visualize the ordered graph in the figure.

Ordered Undirected Graphs

Undirected Graphs — Sequences

Set Numbers — Direct Products

Finite Sets

Equivalent Sets

Function Inverses — Natural Order — Family Unions and Intersections

Function Images — Function Composites — Families

Equivalence Relations — Functions — Peano Axioms

Relations — Natural Induction

Cartesian Products

Set Powers — Natural Numbers — Generalized Set Dualities

Partitions — Unordered Triples — Intersection of Empty Set — Successor Sets — Set Dualities — Set Unions and Intersections

Ordered Pairs — Set Intersections — Pair Unions — Set Complements

Set Unions — Set Differences — Pair Intersections

Unordered Pairs — Empty Set

Set Specification

Set Inclusion

Standardized Accounts

Accounts

Deductions

Quantified Statements

Logical Statements

Statements

Identities — Sets

Names

Letters — Objects