[knowledge base]

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Partial and total order relations on a set

Open Mathematics Collaboration^{*†}

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Abstract

PARTIAL and TOTAL ORDER relations and their underlying definitions are presented in this white paper (knowledge base).

keywords: relation, partial order, total order, knowledge base

The most updated version of this white paper is available at

<https://osf.io/zx8ua/download>

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Definition

1. R is a **PARTIAL ORDER relation** on A if it is **Reflexive, Transitive, and Antisymmetric**

$R, A :=$ sets

$R :=$ binary relation on A

[1]

2. R is a **TOTAL ORDER relation** on A if it is a **partial order**, and

$$\forall x, y \in A \ (xRy \vee yRx).$$

$R, A :=$ sets

$R :=$ partial order relation on A

[1]

Prerequisites

3. Ordered pair

$$(a, b)$$

a := first coordinate

b := second coordinate

[1]

4. Cartesian product

$$A \times B = \{(a, b) \mid a \in A, b \in B\}$$

A, B := sets

$A \times B$:= Cartesian product

[1]

5. Relation from A to B

$$R \subseteq A \times B$$

R, A, B := sets

$x \in A, y \in B, xRy \equiv (x, y) \in R$

[1]

6. Binary relation on A

$$R \subseteq A \times A$$

R, A := sets

relation on A := binary relation on A

[1]

7. R is a **Reflexive Relation** on A if

$$\forall x \in A (xRx) \equiv \forall x \in A ((x, x) \in R)$$

$R, A :=$ sets

$R :=$ binary relation on A

[1]

8. R is a **Transitive Relation** on A if

$$\forall x, y, z \in A ((xRy \wedge yRz) \rightarrow (xRz))$$

$R, A :=$ sets

$R :=$ binary relation on A

[1]

9. R is a **Antisymmetric Relation** on A if

$$\forall x, y \in A ((xRy \wedge yRx) \rightarrow x = y)$$

$R, A :=$ sets

$R :=$ binary relation on A

[1]

Open Invitation

Review, add content, and co-author this white paper [2, 3].

Join the **Open Mathematics Collaboration**.

Send your contribution to `mplobo@uft.edu.br`.

Open Science

The **latex file** for this *white paper* together with other *supplementary files* are available in [4].

Ethical conduct of research

This original work was pre-registered under the OSF Preprints [5], please cite it accordingly [6]. This will ensure that researches are conducted with integrity and intellectual honesty at all times and by all means.

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+ Center for Open Science

<https://cos.io>

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