Why

How does the power set relate to an intersection?

Notation preliminaries

First, if we have a set of sets—denote it $\mathcal{C}$—and all members are subsets of a fixed set—denote it E—then the set of sets is a subset of $\mathcal{P}(E)$. In this case, we can write

$$\bigcap\{X \in \mathcal{P}(E) \mid x \in \mathcal{C}\}$$

Which is a sort of justification for the notation

$$\bigcap_{X \in \mathcal{C}} X.$$

Basic properties

Here are some basic interactions between the powerset and intersections.[1]

Proposition 1. $\mathcal{P}(A) \cap \mathcal{P}(F) = \mathcal{P}((A \cap F))$

Proposition 2. $\bigcap_{X \in \mathcal{A}} \mathcal{P}(A) = \mathcal{P}((\bigcap_{X \in \mathcal{A}} A))$

Proposition 3. $\bigcap_{X \in \mathcal{P}(E)} X = \varnothing$

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[1]Future editions will expand on these propositions and provide accounts of them.

Powers and Intersections

Set Powers

Unordered Triples

Pair Unions

Set Intersections   Set Unions

Pair Intersections   Empty Set   Unordered Pairs

Set Specification

Set Equality

Set Inclusion

Deductions

Quantified Statements

Logical Statements

Statements

Identities   Sets

Names

Letters   Objects