



## 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.<sup>1</sup>

**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.**  $\bigcap_{X \in \mathcal{P}(E)} X = \emptyset$

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<sup>1</sup>Future editions will expand on these propositions and provide accounts of them.



