



FAMILY SET OPERATIONS

Why

Family set operations are common. TODO: this works for infinite stuff too

Definition

We define the set whose elements are the objects which are contained in at least one family member the *family union*. We define the set whose elements are the objects which are contained in all of the family members the *family intersection*.

Notation

We denote the family union by $\cup_{\alpha \in I} A_\alpha$. We read this notation as “union over alpha in I of A sub-alpha.” We denote family intersection by $\cap_{\alpha \in I} A_\alpha$. We read this notation as “intersection over alpha in I of A sub-alpha.”

Results

PROPOSITION 1. For an indexed family $\{A_\alpha\}_{\alpha \in I}$ in S , if $I = \{i, j\}$ then

$$\cup_{\alpha \in I} A_\alpha = A_i \cup A_j$$

and

$$\cap_{\alpha \in I} A_\alpha = A_i \cap A_j.$$

PROPOSITION 2. For an indexed family $\{A_\alpha\}_{\alpha \in I}$ in S , if $I = \emptyset$, then

$$\cup_{\alpha \in I} A_\alpha = \emptyset$$

and

$$\cap_{\alpha \in I} A_{\alpha} = S.$$

PROPOSITION **3.** *For an indexed family $\{A_{\alpha}\}_{\alpha \in I}$ in S .*

$$C_S(\cup_{\alpha \in I} A_{\alpha}) = \cap_{\alpha \in I} C_S(A_{\alpha})$$

and

$$C_S(\cap_{\alpha \in I} A_{\alpha}) = \cup_{\alpha \in I} C_S(A_{\alpha}).$$

