Example of Indexed Set — J = set of People named Joe.

$\forall\ j \in J$, let F_j = set of friends of j. $\{F_j\}$ = indexed collection of sets

1. explain $F_{j_1} \cap F_{j_2}$ people who're friends w/ 2 Joe's

2. $\bigcup_{j\in J} F_j = \{x \mid x \in F_j \text{ for some } j \in J\}$ –

$\bigcap_{j\in J} F_j = \{x \mid x \in F_j\ \forall\ j \in J\}$ = people who're friends w/ every Joe.

The Union Lemma: (Ex)

Let $X = \mathbb{R}$, P = set of all open intervals. Since $\forall\ x \in \mathbb{R}$, $\exists\ p_x \in P$ s.t. $x \in p_x$, the U.L. $\Rightarrow$

~~(((((()))))~~

$\mathbb{R} = \bigcup_{x\in\mathbb{R}} P_x$

Proof

show $X \subset \bigcup_{x\in X} A_x$ & vice versa.

Let $x \in X$. By assumption $\exists\ A_x$ s.t. $x \in A_x$, & since $A_x \subset \bigcup_{x\in X} A_x$ it follows $x \in \bigcup_{x\in X} A_x$

$\Rightarrow \mathbb{R} \subset \bigcup_{x\subset X} A_x$

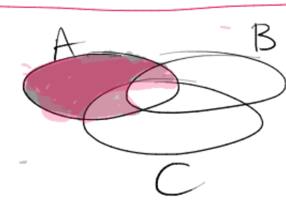
s.t. x = arbitrary

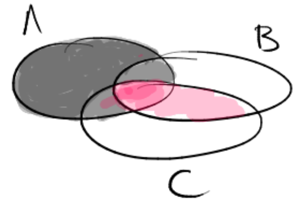
Now since $A_x \subset X$ it follows that $\bigcup A_x \subset X$.

Demorgan's Laws

$A-(B\cup C) = (A-B)\cap(A-C)$

$A-(B\cap C) = (A-B)\cup(A-C)$





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n-sphere: $S^n = \{(x_1, x_2, x_3, \dots, x_n) \mid x_1^2 + x_2^2 + \dots + x_n^2 = 1\}$

$S^0 = .$

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thm. 0.21