Sets

1 Why

We want to generalize the notion of continuity.

2 Definition

A **topological space** is a a subset algebra where the (1) the distinguished subsets include the empty set and the base set, (2) the distinguished subsets are closed under finite family intersections, and (3) the distinguished subsets are closed under family unions. We call the set of distinguished subsets the **topology**. We call the distinguished subsets the **open sets**.

2.1 Notation

Let A a non-empty set. For the set of distinguished sets, we use $\mathcal{T}$, a mnemonic for topology, read aloud as "script T". We denote the topological space with base set A and topology $\mathcal{T}$ by $(A, \mathcal{T})$. We denote the properties satisfied by elements of $\mathcal{T}$:

1. $X, \varnothing \in \mathcal{T}$
2. $\{O_i\}_{i=1}^n \subset \mathcal{T} \implies \cap_{i=1}^n O_i \in \mathcal{T}$
3. $\{O_\alpha\}_{\alpha \in I} \subset \mathcal{T} \implies \cup_{\alpha \in I} \in \mathcal{T}$