

Topology (Main Source: Munkres)

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Part I

Point-Set Topology

CHAPTER 1

TOPOLOGICAL SPACES AND CONTINUOUS FUNCTIONS

1 Topological Spaces

Definition 1.1. (Topology) A *topology* τ on a set X is a collection \mathcal{B} of sets called *open sets* such that:

1. \emptyset and X belong to \mathcal{B}
2. For any collection of sets $U_\alpha \in \mathcal{B}$, $\cup_\alpha U_\alpha$ is also in \mathcal{B} (closed under arbitrary unions)
3. For any finite collection $\{U_1, U_2 \cdots U_k\}$ of sets of \mathcal{B} , $\cap_{i=1}^k U_i \in \mathcal{B}$ (closed under finite intersections)

Definition 1.2. (Discrete and Indiscrete topology)

1. The topology (\emptyset, X) of a set X is called the *indiscrete topology*.
2. The topology in which every subset of X is an open set is called the *Discrete topology*