

Intro to Topology

Sample PreTeXt book

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Chapter 1

Start with the Basics

1.1 Defining a topology

Here's a short paragraph.

Definition 1.1.1 Let X be a set, and let $\mathcal{T} \subseteq \mathcal{P}(X)$ satisfy the following properties.

1. $\emptyset, X \in \mathcal{T}$.
2. If $\mathcal{U} \subseteq \mathcal{T}$, then $\bigcup \mathcal{U} \in \mathcal{T}$.
3. If $U, V \in \mathcal{T}$, then $U \cap V \in \mathcal{T}$.

Then \mathcal{T} is called a **topology** on X , the pair $\langle X, \mathcal{T} \rangle$ is called a **topological space**, and elements $U \in \mathcal{T}$ are called **open sets** of the space. (Usually $\langle X, \mathcal{T} \rangle$ is abbreviated to just X when the topology is known from context.) \diamond

Another short paragraph. Lorem ipsum, etc.

Note 1.1.2 This note should be a slide, but only because slide="true".

This paragraph isn't important.

But this paragraph is, which is why we include it in a slide.

Note 1.1.3 This note should not be a slide since it doesn't have a slide attribute and notes aren't designated in the docinfo.

Theorem 1.1.4 Let X be any set. Then the following sets are topologies on X .

1. $\mathcal{T} = \mathcal{P}(X)$ is called the **discrete topology**.
2. $\mathcal{T} = \{\emptyset, X\}$ is called the **indiscrete topology**.

Proof. Just check the things. \blacksquare

Proposition 1.1.5 Let \mathcal{T} be a topology, and let $\mathcal{U} \subseteq \mathcal{T}$ be finite. Then $\bigcap \mathcal{U} \in \mathcal{T}$.

1.2 More advanced things

Definition 1.2.1 Suppose $D \subseteq X$ and $\text{cl } D = X$. Then D is said to be **dense** in X . \diamond

Lemma 1.2.2 *Lemmas are not included in the slides for some reason, but could be if they were added to the docinfo.*

Theorem 1.2.3 *A subset is dense if and only if it intersects every nonempty open set.*

Corollary 1.2.4 *A subset is dense if and only if every point of the space belongs to it or is a limit point of it. (Corollaries also don't show up in slides according to the docinfo though.)*

Chapter 2

One more chapter

2.1 One more section

Theorem 2.1.1 *A PreTeXt example isn't sufficient without a long math equation.*

Proposition 2.1.2 *This equation appears in a slide.*

$$a^2 + b^2 = c^2$$

Fact 2.1.3 *This equation does not unless docinfo is edited.*

$$\int_0^1 6x^2 dx = 2$$