

Topology and bornology

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1. Introduction

2. Nets

3. Bornology

Definition 3.1. Let X be a set. A *bornology* on X is a collection \mathcal{B} of subsets of X such that

- (1) For any $x \in X$, there is $B \in \mathcal{B}$ such that $x \in B$;
- (2) For any $B \in \mathcal{B}$ and any subset $A \subseteq B$, $A \in \mathcal{B}$;
- (3) \mathcal{B} is stable under finite union.

The pair (X, \mathcal{B}) is called a *bornological set*. The elements of \mathcal{B} are called the *bounded subsets* of (X, \mathcal{B}) . When \mathcal{B} is obvious from the context, we omit it from the notations.

A morphism between bornological sets (X, \mathcal{B}_X) and (Y, \mathcal{B}_Y) is a map of sets $f : X \rightarrow Y$ such that for any $A \in \mathcal{B}_X$, $f(A) \in \mathcal{B}_Y$. Such a map is called a *bounded map*.

Definition 3.2. Let (X, \mathcal{B}) be a bornological set. A *basis* for \mathcal{B} is a subset $\mathcal{A} \subseteq \mathcal{B}$ such that for any $B \in \mathcal{B}$, there are $A_1, \dots, A_n \in \mathcal{A}$ such that $B \subseteq A_1 \cup \dots \cup A_n$.

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Bibliography

- [Stacks] T. Stacks Project Authors. Stacks Project. <http://stacks.math.columbia.edu>. 2020.