Recall the following definitions:

- A **neighborhood** of a point \( x \) in \( \mathbb{R}^n \) is . . .

- A set \( O \) is **open** in \( \mathbb{R}^n \) if every \( x \in O \) is an interior point of \( O \). That is, \( O \) is open in \( \mathbb{R}^n \) if for every \( x \in O \), . . .

- Let \( X \subseteq \mathbb{R}^n \) and \( Y \subseteq \mathbb{R}^m \). A function \( f : X \rightarrow Y \) is **continuous** if . . .

- Two spaces \( X \subseteq \mathbb{R}^n \) and \( Y \subseteq \mathbb{R}^m \) are **homeomorphic** if there exists a homeomorphism \( f : X \rightarrow Y \).

- Let \( X \subseteq \mathbb{R}^n \) and \( Y \subseteq \mathbb{R}^m \). A function \( f : X \rightarrow Y \) is a **homeomorphism** if . . .
Crucial Definitions:

- A **basis** $\beta$ for a topology on a set $X$ is . . .

- A **neighborhood** of a point $x$ in a set $X$ with basis $\beta$ is . . .

- Let $X$ be a set with a basis $\beta$. A set $O \subseteq X$ is **open** (with respect to the basis $\beta$) if . . .

- A **topology** $\mathcal{T}$ on a set $X$ with basis $\beta$ is . . .

- A **topological space** is . . .