

Let  $X$  be a set. The power set of  $X$  is a collection of all subsets of  $X$ , which is denoted by  $\mathcal{P}(X)$ . A subset  $\mathcal{T}$  of  $\mathcal{P}(X)$  is called a **topology** on  $X$  if it satisfies the following conditions:

- $\emptyset, X \in \mathcal{T}$ .
- If  $A \subseteq \mathcal{T}$ , then  $\bigcup A \in \mathcal{T}$ .
- If  $A \subseteq \mathcal{T}$  and  $|A| < \infty$ , then  $\bigcap A \in \mathcal{T}$ .