[] *Separable Metric Space* $\mathbb{X}$: $\mathbb{X}$ is separable if

- $\exists\ Y \subseteq X$ such that
- $Cl_X(Y) = X$
- and Y is countable.

[] *Cover of* $S \subseteq \mathbb{X}$: A collection $\mathcal{O}$ of subsets of $\mathbb{X}$ is a cover of S in $\mathbb{X}$ if

- $S \subseteq \cup\mathcal{O}$.

[] *Open cover of* $S \subseteq \mathbb{X}$: A collection $\mathcal{O}$ of subsets of $\mathbb{X}$ is an open cover of S in $\mathbb{X}$ if

- $S \subseteq \cup\mathcal{O}$
- and each member of $\mathcal{O}$
- is open in $\mathbb{X}$.

[] *Compact subset of* $\mathbb{X}$: A subset S is compact in $\mathbb{X}$ if

- every finite and infinite open cover of S in $\mathbb{X}$
- has a finite subset
- that also covers S.

[] *Totally bounded subset of* $\mathbb{X}$: A subset S is totally bounded in $\mathbb{X}$ if

- for any $\epsilon > 0$
- $\exists$ a finite subset T of S such that
- $S \subseteq \cup\{N_{\epsilon,X}(x) :\ x \in T\}$.

[] *Cauchy sequence in* $\mathbb{X}$: A sequence $\{x^m\} \in X^\infty$ is said to be cauchy if

- for each $\epsilon > 0$
- $\exists$ a real number $M(\epsilon)$ such that
- $d(x^k, x^l) < \epsilon$
- $\forall k, l \geq M(\epsilon)$.

[] *Complete Metric Space* $\mathbb{X}$: A metric space is complete if every cauchy sequence in $\mathbb{X}$

- converges to a point in $\mathbb{X}$.