Basic Definitions

Let $S \subset \mathbb{R}^n$. and $p \in \mathbb{R}^n$.

- S is *bounded* if it is contained in some ball in $\mathbb{R}^n$.
- S is a *neighborhood* of p if S contains some open ball around P.
- A point p is a *limit point* of S if every neighborhood of p contains a point $q \in S$, where $q \neq p$.
- If $p \in S$ is not a limit point of S, then it is called an *isolated point* of S.
- S is *closed* if every limit point of S is a point of S.
- A point $p \in S$ is an *interior point of* S if S contains a neighborhood of p.
- S is *open* if every point of S is an interior point of S.

- Let S' denote all of the limit points of S. Then the *closure* $\bar{S}$ *of* S is the set $S \cup S'$. It is the smallest closed set containing S and is thus the intersection of all the closed sets containing S.
- A subset $T \subset S$ is *dense in* S if every point of S is either in T or a limit point of T (or both).

REMARK: These definitions are unchanged for any *metric space* instead of just $\mathbb{R}^n$.