Topology of $\mathbb{R}^n$

geometry deals with distance & relative position of points.

topology studies relationship between points and sets

most of the ideas of calculus are presented and discussed in a topological setting, using terminologies from topology

Chapter 1 of Folland is about Topology

interior of a Set

$a \in S^{int}$ if $\exists r>0$ $B(r,a) \subset S$

boundary or edge of S

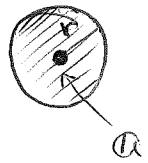
$a \in \partial S$ if $\forall r>0$ $B(r,a) \cap S \neq \emptyset$ & $B(r,a) \cap S^c \neq \emptyset$

$\partial S = \partial S^c$

Basic tool for Studying Topology is the open Ball

$B(r,a) = \{x \in \mathbb{R}^n : |x-a| < r\}$

radius, Center, norm in $\mathbb{R}^n$ euclidean, but it could be any other norm too



a useful decomposition idea:

for any Set S $\mathbb{R}^n = S^{int} \cup \partial S \cup S^{c\,int}$

and S^{int}, ∂S and $S^{c\,int}$ are disjoint

1.14: a) S is open iff $S = S^{int}$

b) S is closed iff S^c is open

points ∂S could: 1. all inside S $\Rightarrow$ S is said to be closed

2. all outside S $\Rightarrow$ S is said to be open

3. some inside, some outside $\Rightarrow$ S is neither closed nor open