

Math 366 - Week 1 - Friday

chapter 0 Reading -

elements
 empty set
 $\mathbb{R}, \mathbb{R}^+, \mathbb{Q}, \mathbb{Z}$
 open interval:
 closed interval:
 closed & bounded interval

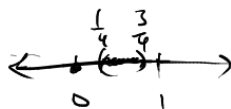
proper subset
 Indexed Collection of Sets
 the Union Lemma
 complement of B in A
 product of A & B
 • DeMorgan's Laws

bounded set in \mathbb{R}^n
 Convex set:
 n-sphere: $\{S^0, S^1, S^2, S^3\}$
 n-ball
 disk = ●
 open disk

Equivalence Relation
 Partition
 mapping, or map
 image of A under f
 constant function
 identity function
 preimage of W

injective • (-1) into
 surjective • onto
 bijective
 inverse function
 restriction

finite
 countably infinite
 uncountable



$$\begin{cases} f: X \rightarrow Y \\ \exists W \subset Y \\ f^{-1}(W) = \{x \in X \mid f(x) = W\} \end{cases}$$

preimage of W.

injective:

$$f: X \rightarrow Y$$

$$f(x) = x^3, \text{ not } f(x) = x^2$$

$$\text{if } f(x) = f(y) \Rightarrow x = y$$

no two points are mapped to same target.

surjective: (ont.)

$$f(x) = x^3 \text{ not } f(x) = x^2$$


$$\forall y \in Y \exists x \in X \text{ st. } f(x) = y$$

for all points in target, there exists something in domain such that (s.t.) y gets hit by x under f .
(f maps x to y)

$$S^0 \subset \mathbb{R} \quad \leftarrow \text{---} \bullet \text{---} \bullet \text{---} \rightarrow$$

$$S^1 \subset \mathbb{R}^2 \quad \text{unit circle.}$$


$$S^2 \subset \mathbb{R}^3$$


$$S^3 \subset \mathbb{R}^4$$


$\bullet \infty$

$$n\text{-sphere} = \{(x_1, x_2, \dots, x_n) \mid x_1^2 + x_2^2 + \dots + x_n^2 = 1\}$$

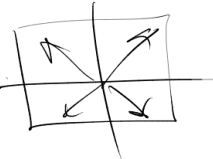
$$0\text{-sphere} = \{x \in \mathbb{R} \mid x^2 = 1\}$$

$$1\text{-sphere} = \{(x_1, x_2) \mid x_1^2 + x_2^2 = 1\}$$

$$\leftarrow \text{---} \bullet \text{---} \rightarrow \mathbb{R} = \text{---} \circ \text{---}$$

$\bullet \infty$

$$\{\mathbb{R}, \bullet\}$$



\mathbb{R}^2

$\bullet \infty$