

Sets and Proofs

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1 Sets

Set: a collection of objects (objects referred to as elements or members)

Represented with $\{ \}$

Ex: $\{x | x \text{ a real number}, x^2 < 2\}$ is read as "the set of all x such that x is a real number and $x^2 < 2$ "

Empty set is: \emptyset insert empty set symb here

$s \in S$ means "s is an element of S" or "s belongs to S" or "s in S"

If not then $t \notin S$

Two sets are equal if they have the same elements

T is a subset of set S if every element of T also belongs to S

Repr: $T \subseteq S$ if T is a subset of S

$T \not\subseteq$ if not

Ex: subsets of $\{1,2\}$ are $\{1,2\}$, $\{2\}$, $\{1\}$, $\{ \}$

Sets can be nested

2 Proofs

$P \Rightarrow Q$: P implies statement Q Ex: $x = 2$ implies $x^2 < 6$ Other ways:

if P then Q

Q if P

$P \Rightarrow Q \neq P \Leftarrow Q$

$P \iff Q$: P if and only iff Q Ex: $x = 2 \iff x^3 = 8$

Negation: "not P", $\neg P$, \overline{P}