What is set?

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- A collection of objects;
- Distinctive elements;
- Finite and infinite;

Set comprehension

Exercise

1. The set of all natural numbers that are either less than five or greater than 20.
2. The set of all pairs of integers such that the sum of the pair of numbers is equal to zero.
3. The set of all real numbers that are also positive.

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Formal

1. $S = \{n \mid n \in \mathbb{N}, n < 5 \vee n > 20\}$
2. $S = \{(n_1, n_2) \mid n_1 + n_2 = 0\}$.
3. $S = \{r \mid r \in \mathbb{R}, r > 0\}$

Set operations

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Union($\cup$), intersection($\cap$), difference($-$), complement(), cartesian product($\times$), subset($\subseteq, \subset$), equality($=$), power set($\mathcal{P}$).

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Exercise for difference and complement

- $S_1 - S_2 = \{x \mid x \in S_1 \wedge x \notin S_2\}$.
- $S_1 \cap \overline{S_2} = \{1, 6, 8\}$.

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Exercise for others

1. $S \cap T = \{4, 5\}$.
2. $S \cup T = \{1, 2, 3, 4, 5\}$.
3. $\overline{T} = \{1, 3\}$.
4. $(S - T) \times T = \{(1, 2), (1, 4), (1, 5), (3, 2), (3, 4), (3, 5)\}$.
5. $\mathcal{P}(\overline{T}) = \{\emptyset, \{1\}, \{3\}, \{1, 3\}\}$ (the size of power-set is 2^n).

Q & A