1 Set Notation

Sets are denoted with capital letters, e.g. A, B, C. The elements of a set are listed inside curly brackets:

$$\begin{aligned} A &= \{1, 2, 3\} \\ B &= \{a, b, c\} \end{aligned}$$

The union of two sets A and B is denoted A
$cupB$ and contains all elements of both sets. The intersection A
$capB$ contains elements common to both.

$$\begin{aligned} &A \cup B = \{1, 2, 3, a, b, c\} \\ &A \cap B = \emptyset \end{aligned}$$

Sets can also be described using set builder notation:

$$\begin{aligned} C &= \{x \mid x \in \mathbb{N}, 0 \leq x \leq 5\} \\ &= \{x \mid x \text{ is natural}, 0 \leq x \leq 5\} \end{aligned}$$

This covers the basics of set notation and operations in LaTeX math mode. Additional set theory topics like power sets, Cartesian products, etc. could be added.

$$\begin{aligned} \text{bunnies} &= E(n\_g + 1' \mid n\_i''; 1 \leq i \leq g) \\ &= \{\text{Who knows, it's all pipes!}\} \end{aligned}$$

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$$\{a, b\} = \{b, a\} \qquad \text{Still talking about sets.}$$

About the size of Cartesian products:

$$\begin{aligned} &\text{ayy} \\ |\mathbf{A}| \cdot |\mathbf{B}| &= |\mathbf{A} \times \mathbf{B}| \\ \mathbf{R}^{-1} &= \{(b, a) \in \mathbf{B} \times \mathbf{A} \mid (a, b) \in \mathbf{R}\} \end{aligned}$$

2 Predicate logic

Let S be the set of students, B be the set of bars in Guildford, and V(x,y) means x has visited y.

$$\exists x \in \mathbf{S}.\forall y \in \mathbf{B}.V(x,y)$$

Let S be the set of students, B be the set of bars in Guildford, T(x) be the predicate for "x studies hard", and D(x) for "x does well in exams".

$$(\forall x \in S.T(x)) \implies (\forall s \in S.D(s))$$

$$\begin{aligned}(\exists a \in A.D(a).G(a) \wedge \exists b \in A.D(b).G(b))\\ \implies a = b\end{aligned}$$