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:

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

Let S be the set of students.
Let B be the set of bars in Guildford.
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.
Let **B** be the set of bars in Guildford.
T(x) means x studies hard.
D(x) means x does well in exams.

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

$$\exists a \in \mathbf{A}.D(a).G(a) \wedge \exists b \in \mathbf{A}.D(b).G(b)$$