Chapter 1

Mathematics

1.1 Set Theory

$\{ x : x \in \mathbb{R} \mid x > 0 \}$ is the set of all strictly positive real numbers.

S = letters of the alphabet.

$|S| = 26$

Power of Sets

$$S = \{a, b, c\}$$
$$\mathcal{P}(S) = \{\varnothing, \{a\}, \{b\}, \{c\}, \{a, b\}, \{a, c\}, \{b, c\}, \{a, b, c\}\}$$

Let $A = \{1, 2, 3\}$ and $B = \{3, 4, 5\}$:

Union: $A \cup B = \{1, 2, 3, 4, 5\}$
Intersection: $A \cap B = \{3\}$
Complement: $A \setminus B = \{1, 2\}$
Symmetric Difference: $A \triangle B = \{1, 2, 4, 5\}$

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Cartesian products

$$A \times B = \{(1, 3), (1, 4), (2, 3), (2, 4)\}$$

$$B \times A = \{(3, 1), (3, 2), (4, 1), (4, 2)\}$$

$$A \times B \neq B \times A$$