Formal Languages

A formal language is a notation that is a set of strings conforming to some pattern/structure. Typically they're described in e.g. regular expressions or context-free grammars.

Symbols, Alphabets, and Strings

Alphabet A finite set of symbols
String A finite sequence of zero or more symbols from a specific alphabet

- Also ϵ, which represents an empty string

String Length and Equailty

Length of a string xyz represented by $|xyz|$.

Strings are equal if they match in length and every symbol is the same and in the same position.

String Concatenation

Uses the . operator:

$$abcd \cdot efg = abcdefg$$

$$\epsilon \cdot xyz = xyz = xyz \cdot \epsilon$$

Repetition

x^n is n repetitions of x concatenated together:

$$x^n = x \cdot x \cdot x \cdot \ldots x$$

$$x^0 = \epsilon$$

Language

A set of strings over a specific alphabet.

- $\emptyset$ is used to represent the empty language.

Concatenation of Languages

- $L_1 \cdot L_2$ contains all concatenations of $s_1 \in L_1$ and $s_2 \in L_2$
- $L^2 = L \cdot L$, $L^2 = L \cdot L \cdot L$, ...