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# 1. Regular Languages

## 1.1 Formal Languages

**Alphabet**: Finite, nonempty set. Denoted by Σ.

**Characters, Letters, Symbols**: Elements of an alphabet

**Word, String**: Sequence that can be obtained by concatenating any finite number of letter of the alphabet

**Empty word**: Consists of no letters. Denoted by εn

**Language**: finite or infinite set that contains words over the alphabet

**Σk**: language that contains all words with exactly k letters. **Σ0** is **{ε}**

**Kleene Closure**: Σ∗ = Σ0 ∪ Σ1 ∪ Σ2 ∪ ...

Σ+ = Σ0 ∪ Σ1 ∪ Σ2 ∪ ... : all non-empty words

**Complement of L**: LC = Σ∗ \ L

**Concatenation of L1 and L2**: L1 ◦ L2 = L1L2 = {vw | v ∈ L1 and w ∈ L2}

**kth power of a language L**: Lk+1 = LkL

## 1.2 Deterministic Finite Automata