CS321 Notes

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Languages

- $\lambda \in \Sigma^*$.
- $\overline{L} = \Sigma^* - L$.
- $L^* | \{aa, bb\} = L$.
- $|L| = 2$.
- $L^* = \{aa, aabb, bbaa, \ldots\}$.
- $bbbaa \notin L^*$.

Decision Problems

$L = \{w : w \text{isavalidCprogram}\}$. This is the first thing a syntax checker does. Ensure the strings in the program are in the Language.

Halting Problem

$L = \{w : w$ is a valid C program that halts given no input $\}$.

DFA: Deterministic Finite (Acceptor—Automatan)

$M = (Q, \Sigma, \delta, q_0, F), F \subseteq Q$

$\delta(q_0, b) = q_1$

$\delta^*(q, w) =$ What state will DFA be in after reading w from q.

$\delta^*(q_0, aabb) = q_1$.

$L(M)$ is the language of machine M (The set of strings accepted by M).

$L(M) = \{w : w \in \Sigma^*, \delta^*(q_0, w) \in F\}$

M Represents the DFA. $\delta^*(q_0, w) \in F\}$ - end up in final sate starting in q_0 and reading w.

Regular Language A language L is regular iff there exists a DFA M such that $L = L(M)$.

Examples

Show the following language is regular.

$L = \{w : w \in \{a, b\}^*$, each a in w is immediately preceeded by a b $\}$.

$$a \notin L$$
$$ba \in L$$
$$\lambda \in L$$
$$bbaa \notin L$$
$$bb \in L$$

$$\delta^*(q, \lambda) = q_1$$
$$\delta^*(q, a) = \ldots$$