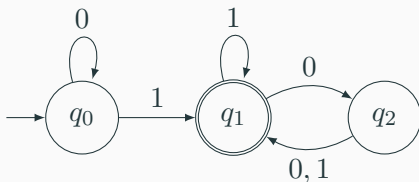


Examples of Deterministic Finite Automata

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Deterministic Finite Automaton: Example 1

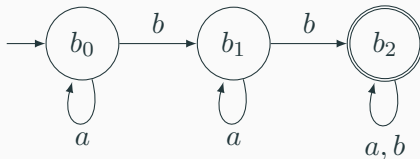


Try running the following strings on the automaton.

1101, 1, 01, 11, 0101010101

Describe the strings that the automaton recognises.

Deterministic Finite Automaton: Example 2

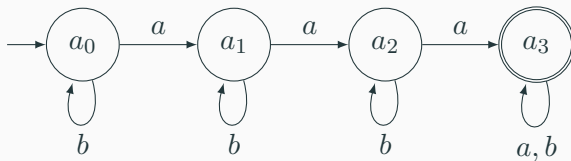


Try running the following strings on the automaton.

aaaa, ababa, bababb, abaa

Describe the strings that the automaton recognises.

Deterministic Finite Automaton: Example 3



Try running the following strings on the automaton.

aaaa, ababa, bababb, abaa

Describe the strings that the automaton recognises.

Deterministic Finite Automaton (DFA) definition

A DFA is a 5-tuple $(Q, \Sigma, \delta, q_0, F)$ where

Q is a finite set of *states*,

Σ is a finite set called the *alphabet*,

δ is the *transition function* $(Q \times \Sigma \rightarrow Q)$,

q_0 is the *start state* ($\in Q$), and

F is the set of *accept states* ($\subseteq Q$).

Example 1 definition

$$Q = \{q_0, q_1, q_2\}$$

$$\Sigma = \{0, 1\}$$

$$\delta = \{((q_0, 0), q_0), ((q_0, 1), q_1), ((q_1, 0), q_2), ((q_1, 1), q_1), \\ ((q_2, 0), q_1), ((q_2, 1), q_1)\}$$

$$q_0 = q_0$$

$$F = \{q_1\}$$

Example 2 definition

$$Q = \{b_0, b_1, b_2\}$$

$$\Sigma = \{a, b\}$$

$$\delta = \{((b_0, a), b_0), ((b_0, b), b_1), ((b_1, a), b_1), ((b_1, b), b_2), \\ ((b_2, a), b_2), ((b_2, b), b_2)\}$$

$$q_0 = b_0$$

$$F = \{b_2\}$$

Example 3 definition

$$Q = \{a_0, a_1, a_2, a_3\}$$

$$\Sigma = \{a, b\}$$

$$\delta = \{((a_0, a), a_1), ((a_0, b), a_0), ((a_1, a), a_2), ((a_1, b), a_1), \\ ((a_2, a), a_3), ((a_2, b), a_2)\}, ((a_3, a), a_3), ((a_3, b), a_3)\}$$

$$q_0 = a_0$$

$$F = \{a_3\}$$