

Week1 friday

****This definition was in the pre-class reading**** A finite automaton (FA) is specified by $M = (Q, \Sigma, \delta, q_0, F)$. This 5-tuple is called the **formal definition** of the FA. The FA can also be represented by its state diagram: with nodes for the state, labelled edges specifying the transition function, and decorations on nodes denoting the start and accept states.

Finite set of states Q can be labelled by any collection of distinct names. Often we use default state labels q_0, q_1, \dots

The alphabet Σ determines the possible inputs to the automaton. Each input to the automaton is a string over Σ , and the automaton “processes” the input one symbol (or character) at a time.

The transition function δ gives the next state of the automaton based on the current state of the machine and on the next input symbol.

The start state q_0 is an element of Q . Each computation of the machine starts at the start state.

The accept (final) states F form a subset of the states of the automaton, $F \subseteq Q$. These states are used to flag if the machine accepts or rejects an input string.

The computation of a machine on an input string is a sequence of states in the machine, starting with the start state, determined by transitions of the machine as it reads successive input symbols.

The finite automaton M accepts the given input string exactly when the computation of M on the input string ends in an accept state. M rejects the given input string exactly when the computation of M on the input string ends in a nonaccept state, that is, a state that is not in F .

The language of M , $L(M)$, is defined as the set of all strings that are each accepted by the machine M . Each string that is rejected by M is not in $L(M)$. The language of M is also called the language recognized by M .

What is **finite** about all finite automata? (Select all that apply)

- ☐ The size of the machine (number of states, number of arrows)
- ☐ The length of each computation of the machine
- ☐ The number of strings that are accepted by the machine



The formal definition of this FA is

Classify each string $a, aa, ab, ba, bb, \varepsilon$ as accepted by the FA or rejected by the FA.

Why are these the only two options?

The language recognized by this automaton is



The language recognized by this automaton is



The language recognized by this automaton is