Week1 friday

Review: Determine whether each statement below about regular expressions over the alphabet $\{a, b, c\}$ is true or false:

True or False: $a \in L(\ (a \cup b)\ \cup c)$

True or False: $ab \in L(\ (a \cup b)^*\ )$

True or False: $ba \in L(\ a^*b^*\ )$

True or False: $\varepsilon \in L(a \cup b \cup c)$

True or False: $\varepsilon \in L(\ (a \cup b)^*\ )$

True or False: $\varepsilon \in L(\ a^*b^*\ )$

From the pre-class reading, pages 34-36: A deterministic finite automaton (DFA) is specified by $M = (Q, \Sigma, \delta, q_0, F)$. This 5-tuple is called the **formal definition** of the DFA. The DFA 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 $q0, q1, \ldots$

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 DFA 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 DFA, $F \subseteq Q$. 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 DFA 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 deterministic finite automata? (Select all that apply)

☐ The size of the machine (number of states, number of arrows)

☐ The number of strings that are accepted by the machine

☐ The length of each computation of the machine

The formal definition of this DFA is

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

Why are these the only two options?

The language recognized by this DFA is

The language recognized by this DFA is

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