## Week2 friday

Nondeterministic finite automaton  $M = (Q, \Sigma, \delta, q_0, F)$ 

Finite set of states Q Can be labelled by any collection of distinct names. Default:  $q0, q1, \ldots$ 

Alphabet  $\Sigma$  Each input to the automaton is a string over  $\Sigma$ .

Arrow labels  $\Sigma_{\varepsilon}$   $\Sigma_{\varepsilon} = \Sigma \cup \{\varepsilon\}.$ 

Arrows in the state diagram are labelled either by symbols from  $\Sigma$  or by  $\varepsilon$ 

Transition function  $\delta$   $\delta: Q \times \Sigma_{\varepsilon} \to \mathcal{P}(Q)$  gives the **set of possible next states** for a transition

from the current state upon reading a symbol or spontaneously moving.

Start state  $q_0$  Element of Q. Each computation of the machine starts at the start state.

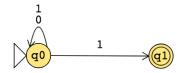
Accept (final) states  $F F \subseteq Q$ .

M accepts the input string if and only if **there is** a computation of M on the input string

that processes the whole string and ends in an accept state.

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The formal definition of the NFA over  $\{0,1\}$  given by this state diagram is:



The language over  $\{0,1\}$  recognized by this NFA is:

Change the transition function to get a different NFA which accepts the empty string.

The state diagram of an NFA over  $\{a,b\}$  is below. The formal definition of this NFA is:



The language recognized by this NFA is: