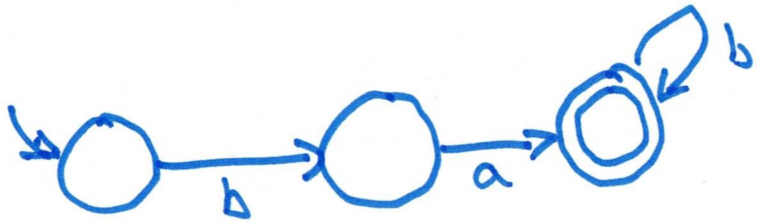


bab^*

NFA NONDETERMINISTIC FINITE AUTOMATA

$(Q, \Sigma, \delta, q_0, F)$

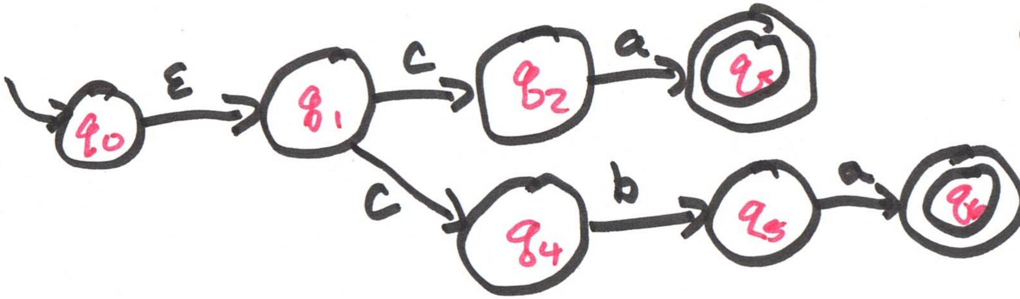
Q : states

Σ : alphabet

δ : $Q \times \{\Sigma \cup \{\varepsilon\}\} \rightarrow 2^Q$

q_0 : start state $\quad q_0 \in Q$

F : final states $\quad F \subseteq Q$



$\left.\begin{array}{l} ca \\ cba \end{array}\right\} ca|cba$

NFA: $(N, \Sigma, \delta_N, n_0, F_N)$

$\Downarrow$ construct

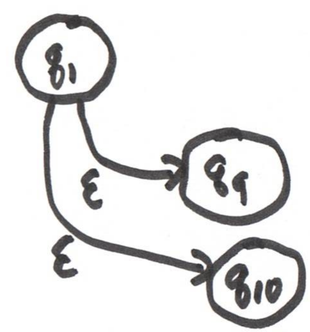
DFA: $(D, \Sigma, \delta_D, d_0, F_D)$

each state of D corresponds to a set of states of N

$\{n_0, n_1, n_3\} \in D$

F_D = those subsets (states of D) that contain a state of F_N.

ε-closure$(\{\underline{q_1, q_2, q_3}\})$ = set of all states reachable from $\{q_1, q_2, q_3\}$ by using only edges labelled ε



$\{q_1\} \rightarrow \{q_1, q_9, q_{10}\}$

$d_0 = \varepsilon$-closure(n_0)

$\delta_D(d, a)$

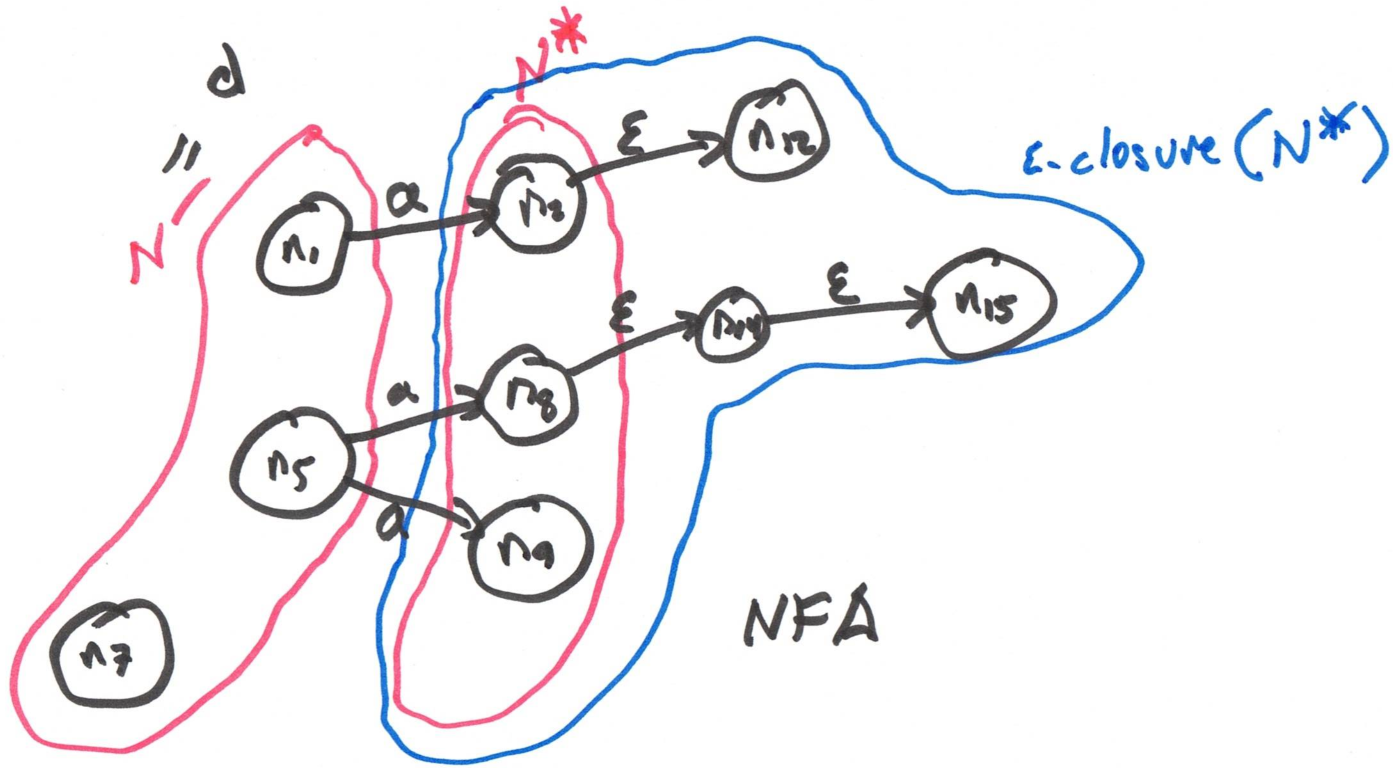
d: state of DFA

$a \in \Sigma$

d corresponds to a subset N' of N

construct $\delta_N(N', a) = \bigcup_{n \in N'} \delta_N(n, a) = N^*$

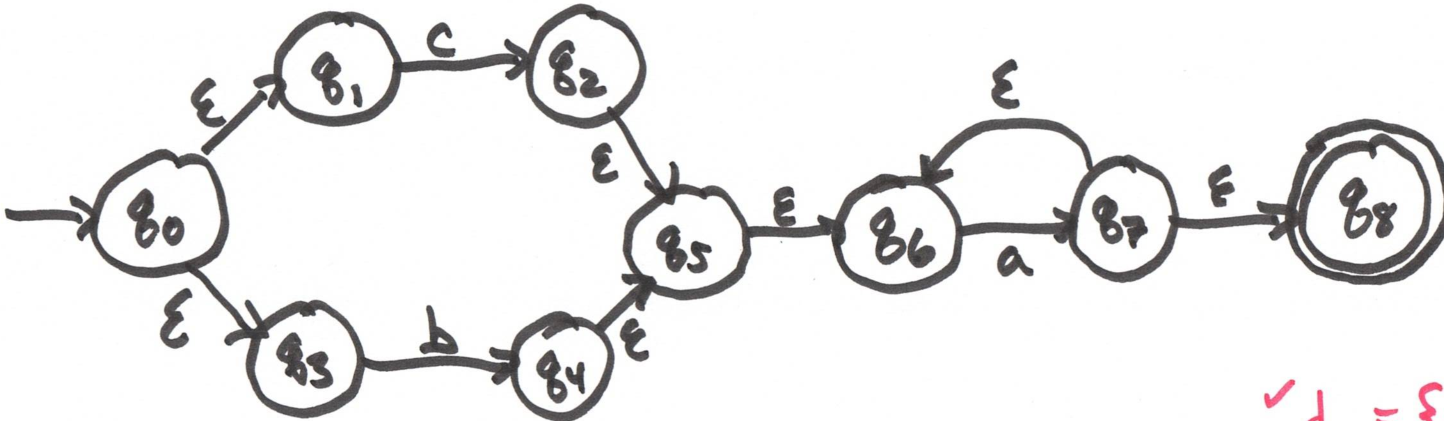
$\delta_D(d, a) = \varepsilon\text{-closure}(N^*)$



SUBSET CONSTRUCTION

```
    d0 = ε-closure(n0)
    D = {d0}
worklist = {d0}
while (!worklist.isEmpty()) {
    remove a state d from worklist

    //expand state d:
    for each character c ∈ Σ
        d' = ε-closure(δN(d,c))
        δD[d,c] = d'
        if d' ∉ D then
            D = D ∪ d'
            add d' to worklist
```



✓ $d_0 = \{q_0\ q_1,\ q_3\}$

✓ $d_1 = \{q_4\ q_5\ q_6\}$

✓ $d_2 = \{q_2\ q_5,\ q_6\}$

✓ $d_3 = \{q_6\ q_7\ q_8\}$

	a	b	c
d_0	—	d_1	d_2
d_1	d_3	—	—
d_2	d_3	—	—
d_3	d_3	—	—