NFA with $\varepsilon$ transition $\rightarrow$ normal NFA

$\varepsilon$-closure of a state $q$ is all the states $p$ s.t. $q \xrightarrow{\varepsilon} p$

$\varepsilon$-closure of state $q_0$ is $\{ q_0, q_1, q_2 \}$

$\delta(q, \varepsilon)$:
- $\varepsilon$-closure of $q_1$ is $\{ q_1, q_2 \}$
- $\varepsilon$-closure of $q_2$ is $\{ q_2 \}$

So $\delta'$ is the transition function of NFA

$\delta'(q, a) = \{ \phi \mid \phi \in \delta(q, \varepsilon a \varepsilon) \}$
\[ g' : \text{trap stab} \]

\[
\delta'(q_0, 1) \subseteq \mathcal{D}[\{q_1, q^*\}] = \{q_1, q_2\}
\]

\[
\delta'(q_0, 2) \subseteq \mathcal{D}[\{q_2, q^*\}] = \{q_2, q\}
\]
$F'$: the set of final states in the new machine $F \cup \{q_0\}$ if $E \in CL(\gamma_0)$ contains $F$

Given a DFA $M$ we want to find an equivalent r.e. for the $L(M)$.

We will define r.e. for the set $\gamma$ s.t. $\gamma(q_i \rightarrow q_j)$, we are interested in $U(q_{\gamma_1}, q_{\gamma_k})$, $q_k \in F.$
\( R^k_{i,j} \): reg expression corresponding 2 strings that take us from state \( q_i \) to \( q_j \)

using \( \text{intermediate} \) states in \( \{q_1, q_2, ..., q_k\} \)

NOT including the initial/lead state

Finally we are interested in

\[ R^\sim_{i,j} \neq i,j \]

Box case \( K=0 \): no intermediate state can be used

Only direct transitions will be counted

\( R^0_{i,j} \) can be represented directly from the state transition diagram
\[
R_{i,j}^{k+1} = R_{i,j}^k \cup R_{i,k+1}^{(K)} \cdot R_{k+1,k+1}^{(cK)} \cdot R_{k+1,j}^{(K)}
\]