$\varepsilon$ - no input
$q_0$ on 1 to $\{q_0, q_2\}$
$q_0$ on 0 to $\{q_0, q_2\}$
$q_0$ on 0?
input: 0011
starts w/ 0

even # of 1's
NFA: \((Q, \Sigma, \delta, q_0, F)\)

1. \(Q\): set of states
2. \(\Sigma\): alphabet
3. \(q_0 \in Q\)
4. \(F \subseteq Q\)
5. \(\delta: Q \times \Sigma \epsilon \rightarrow P(Q)\)

\[\Sigma_\epsilon = \Sigma \cup \{\epsilon\}\]
Every NFA has an equiv. DFA

Let \( N = (Q, \Sigma, \delta, q_0, F) \) be an NFA recognizing some language \( A \).

Construct DFA \( M = (Q', \Sigma, \delta', q_0', F') \)

consider \( N \) w/ no \( \varepsilon \)-transitions

1. \( Q' = P(Q) \)
2. \( \Sigma \)
4. \( q_0' = \{ q_0 \} \)
5. \( F' = \{ R \in Q' : R \text{ contains an accepting state of } N \} \)
3. \( \delta' \) for \( R \in Q' \) and \( a \in \Sigma \)

\[
\delta'(R, a) = \{ q \in Q : q \in \delta(r, a) \text{ for some } r \in R \}
\]
\( \varepsilon \text{-Transitions} \)

\[ E(R) = \{ q \mid q \text{ can be reached from } R \text{ by following any number of } \varepsilon \text{-transitions} \} \]

3. \( \delta'(R, a) = \{ q \in Q \mid q \in E(\delta(R, a)) \text{ for some } r \in R \} \)

4. \( q_0' = \{ E(q_0) \} \)