Figure 1.27

Symbol read

Nondeterministic Finite Automaton (NFA)

Figure 1.29
FIGURE 1.31

FIGURE 1.32
\[ N = ( Q, \Sigma, \delta, q_0, F ) \]

\[ S : Q \times \Sigma \rightarrow 2^Q \]

\[ \Sigma_\varepsilon = \Sigma \cup \{ \varepsilon \} \]

\( Q, \Sigma, q_0, F \) as in DFA
DEF ("M is in state 8")

\( M \) ends in state 8 after reading \( w \) \( \in \Sigma^* \) if

1. \( w = w_1w_2 \ldots w_n \)
   where \( w_i \in \Sigma \cup \{\epsilon\} \)

2. \( \exists \) states \( r_0, r_1, r_2 \ldots r_n \in Q \)

   \( \forall (a) \quad r_0 = q_0 \)

   \( \forall (b) \quad \forall 1 \leq i \leq n \)

   \( r_i \in S \left( r_{i-1}, w_i \right) = \forall r_i \)

\( \forall (c) \quad r_n = 8 \)

\textbf{Fact:} 8 is unique because \( S \) is a function, basically

\( M \) accepts \( w \) \( \iff \) the state 8 reached by \( M \) after reading

\( w \) \( \in \) \( \Sigma^* \) \( \subseteq F \)

\( L(M) = \{ w \in \Sigma^+ | M \text{ accepts } w \} \)