37. Let $M$ be the NFA-$\lambda$.

$\lambda$-closure: $q_i$ for $i = 0, 1, 2, 3$.

b) Give the input transition function $t$ for $M$.

c) Use Algorithm 5.6.3 to construct a state diagram of a DFA that is equivalent to $M$.

d) Give a regular expression for $L(M)$.

38. Use Algorithm 5.6.3 to construct the state diagram of a DFA equivalent to the NFA in Example 5.5.2.

39. Use Algorithm 5.6.3 to construct the state diagram of a DFA equivalent to the NFA in Exercise 17.

40. For each of the following NFAs, use Algorithm 5.6.3 to construct the state diagram of an equivalent DFA.

a) $\delta(q_0, a) = q_1$

b) $\delta(q_0, b) = q_0$

41. Build an NF transitions to function of $M$.

42. Build an NF transitions to function of $M$.

43. Assume that $\delta(q_0, b) = q$.

44. Show that $\delta(q_0, a) = q_1$.

45. For each DFA:

a) Trace the value

b) Give the

c) Give the
Exercises

Chapter 5.

1. Use the technique from Section 6.2 to build the state diagram of an NFA-\( \lambda \) that accepts the language \((ab)^*ba\). Compare this with the DFA constructed in Exercise 5.22(a).

2. For each of the state diagrams in Exercise 5.40 use Algorithm 6.2.2 to construct a regular expression for the language accepted by the automaton.

3. The language of the DFA \( M \) in Example 5.3.4 consists of all strings over \( \{a, b\} \) with an even number of \( a \)'s and an odd number of \( b \)'s. Use Algorithm 6.2.2 to construct a regular expression for \( L(M) \). Exercise 2.38 requested a nonalgorithmic construction of a regular expression for this language, which, as you now see, is a formidable task.

4. Let \( G \) be the grammar

\[
G: \quad S \rightarrow aS \mid bA \mid a \\
A \rightarrow aS \mid bA \mid b.
\]

a) Use Theorem 6.3.1 to build an NFA \( M \) that accepts \( L(G) \).
b) Using the result of part (a), build a DFA \( M' \) that accepts \( L(G) \).
c) Construct a regular grammar from \( M \) that generates \( L(M) \).
d) Construct a regular grammar from \( M' \) that generates \( L(M') \).
e) Give a regular expression for \( L(G) \).

5. Let \( M \) be the NFA

\[
\begin{align*}
&\begin{array}{c}
\overset{a}{q_0} \quad a \\
\overset{b}{q_1} \quad a \\
\overset{b}{q_2}
\end{array}
\end{align*}
\]

a) Construct a regular grammar from \( M \) that generates \( L(M) \).
b) Give a regular expression for \( L(M) \).