In all the textbook exercises, the phrase “deterministic finite-state automaton” means an ordinary finite-state automaton as we’ve been using that name in lecture.

1. Let \( M = (S, I, f, s_0, F) \) be a finite-state automaton, let \( s \in S, \ x \in I^*, \) and \( y \in I^*. \) Prove that
\[
f(s, xy) = f(f(s, x), y)
\]
by induction on \(|y|\), the length of the string \( y.\)


4. Section 12.3, exercise 42.

5. Section 12.4, exercise 6, parts c and d. In addition, give a finite-state automaton for the set in part c.

6. Section 12.4, exercise 22.