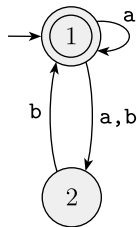


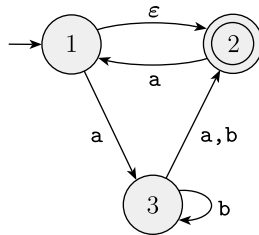
Homework 2

The problems below are either restatements or slight adaptations of problems in the Sipser textbook.

- 1 Draw NFAs with the specified number of states recognizing the following languages over the binary alphabet:
 - a. the language $\{0\}$, with two states;
 - b. the language of strings that end in 00, with three states.
- 2 Draw NFAs for the following languages:
 - a. binary strings that begin with a 1 and end with a 0, or contain at least three 1s;
 - b. binary strings that contain the substring 1010 or do not contain the substring 110.
- 3 Let $L = \{w : w \text{ contains an even number of 0s and an odd number of 1s and does not contain the substring } 01\}$. Draw a DFA with five states that recognizes L .
- 4 Let L be the language of all strings over $\{0, 1\}$ that do not contain a pair of 1s that are separated by an odd number of symbols. Draw a DFA with five states that recognizes L .
- 5 Let L_n be the language of all binary strings of the form $\overbrace{111 \dots 1}^k$ for some k that is a multiple of n . For each $n \geq 1$, construct a DFA or NFA that recognizes L_n .
- 6 Let D be the language of binary strings that contain an equal number of occurrences of the substrings 01 and 10. Thus $101 \in D$ because 101 contains a single 01 and a single 10, but $1010 \notin D$ because 1010 contains two 10s and one 01. Construct a DFA or NFA for D .
- 7 Convert the following nondeterministic finite automata to equivalent deterministic finite automata.



(a)



(b)