CS 3530: Assignment 1a

Fall 2023

Your Name Here

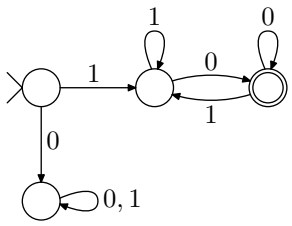
Exercise 1.6bcefm (15 points)

Problem

Give state diagrams of DFAs recognizing the following languages. In all parts the alphabet is $\{0, 1\}$.

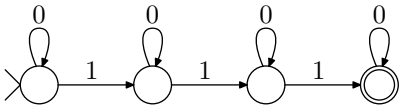
a. *Example* Language: $\{w | w$ begins with a 1 and ends with a $0\}$

Solution



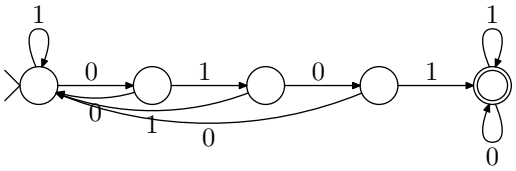
b. Language: $\{w | w$ contains at least three 1s$\}$

Solution



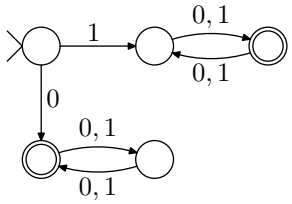
c. Language: $\{w | w$ contains the substring 0101, i.e., $w = x0101y$ for some x and $y\}$

Solution



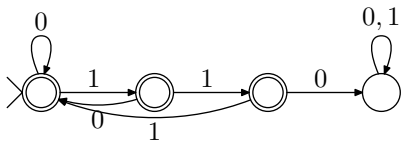
e. Language: $\{w | w$ starts with 0 and has odd length, or starts with 1 and has even length$\}$

Solution



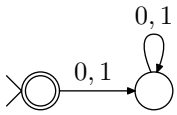
f. Language: $\{w | w$ doesn't contain the substring 110$\}$

Solution



m. Language: The empty set

Solution



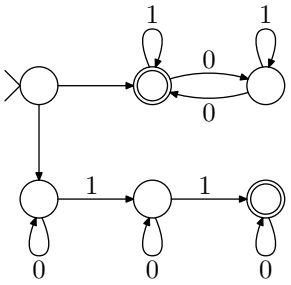
Exercise 1.7c (5 points)

Problem

Give state diagrams of NFAs with the specified number of states recognizing each of the following languages. In all parts the alphabet is $\{0, 1\}$.

c. Language: $\{w|w$ contains an even number of 0's, or contains exactly two 1s$\}$ with six states

Solution



I do not like this solution because it is unclear which route to initially. The top and bottom paths each individually represent the two different valid conditions of the 'or', but do not link together in a cohesive way.