Homework Assignment 6
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Due on Nov. 17, 2004 by 1pm

1 Exercise 1

For each of the following languages (a)-(c), draw the diagram of a non-deterministic FSA that recognizes it with the indicated number of states. \( \Sigma = \{0,1\} \).

a. The language \( 0^*11^*0^*1 \), with four states, only one of which is an accept state.
b. \( \{\epsilon, 0, 10, 110, 010\} \), with four states, only one of which is an accept state.
c. \( \{w: w \text{ does not contain the sub-string } 00, \text{ or } w \text{ contains exactly one } 1s \text{ (and any number of } 0s), \text{ or both}\} \), with five states or less.
   E.g. 001, 01011, and 01 are accepted strings. 1001 is not accepted.

2 Exercise 2

Exercise 4 in Partee et al. p. 482.

3 Exercise 3

Take non-deterministic finite state automaton given below. Construct an equivalent deterministic finite state automaton that accepts the same language, using the proof we learned in class for Theorem 1.19. That is, apply the algorithm for converting any NFA to an equivalent DFA, and provide the full-fledged description \((Q', \Sigma, \delta', q_0', F')\) and the (simplified) diagram of the resulting deterministic FSA. Specify which of the strings below are accepted by both automata and which are rejected by both. Assume that the alphabet is \( \{0,1\} \).

![Diagram of FSA](image)

a. \( \epsilon \)  

f. \( 11 \)
b. 0  

g. \( 10 \)
c. 000  

h. \( 11111 \)
d. 01111  

i. \( 110110 \)
e. 1  

j. \( 101000 \)