Exercise 1: Drawing DFAs  

Construct DFAs that recognize the following languages. The alphabet set is $\Sigma = \{0, 1\}$.

1. $L_1 = \{w \mid w$ is any string except 11 and 111\}.
2. $L_2 = \{w \mid w$ contains at least two 0s and at most one 1\}.
3. Construct a DFA which accepts the language $L_2 \setminus L_1 = \{w \mid w \in L_2$ and $w \notin L_1\}$.

Exercise 2: Closure under Set Difference  

Let $L, L_1, L_2$ be regular languages. Show that both $\overline{L} := \Sigma^* \setminus L$ and $L_1 \cap L_2$ are regular as well by constructing the corresponding DFAs. Deduce that $L_1 \setminus L_2$ is also regular.

Remark: No need for drawing state diagrams. Show how a DFA for the language in question can be constructed presuming the existence of DFAs for $L, L_1, L_2$.

Exercise 3: From NFA to DFA  

Consider the following NFA.

(a) Give a formal description of the NFA by giving the alphabet, state set, transition function, start state and the set of accept states.

(b) Construct a DFA which is equivalent to the above NFA by drawing the corresponding state diagram.

(c) Explain which language the automaton accepts.