Theory of Computation,
Dept. of Computer Science & Engineering, Konkuk Univ.

Homework #2

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

a. The language $\{\mathtt{0}\}$ with two states

b. The language $\{\varepsilon\}$ with one state

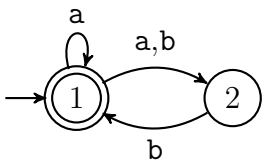
c. The language $\mathtt{0}^*$ with one state

d. The language $\mathtt{0}^*\mathtt{1}^*\mathtt{0}^+$ with three states

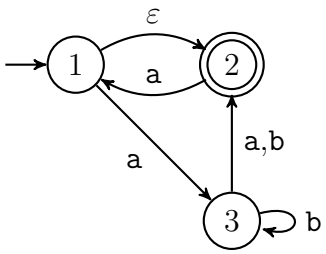
e. The language $\{w \mid w$ contains the substring $\mathtt{0101}$ (i.e., $w = x\mathtt{0101}y$ for some x and $y)\}$ with five states

2. Use the construction given in Theorem 1.39 to convert the following two nondeterministic finite automata to equivalent deterministic finite automata.

a.



b.



3. Use the procedure described in Lemma 1.55 to convert the following regular expressions to nondeterministic finite automata.

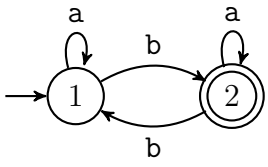
a. $(\mathtt{0} \cup \mathtt{1})^*\mathtt{000}(\mathtt{0} \cup \mathtt{1})^*$

b. $(((\mathtt{00})^*(\mathtt{11})) \cup \mathtt{01})^*$

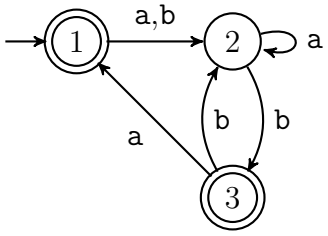
c. $\emptyset^*$

4. Use the procedure described in Lemma 1.60 to convert the following finite automata to regular expressions.

a.



b.



5. By using the pumping lemma, prove that the following language is not regular.

$$A = \{www \mid w \in \{a, b\}^*\}$$