# CSI 409: Conversion of NFAs to DFAs
# Some sample problems

1. Consider the following NFA. The set of states, $Q$, is $\{q_0, q_1, q_2, q_3\}$. The initial state is $q_0$ and the accepting state is $q_3$. The alphabet is $\{a, b\}$.

| | a | b | $\varepsilon$ |
|---|---|---|---|
| $q_0$ | $\emptyset$ | $\{q_1\}$ | $\{q_2\}$ |
| $q_1$ | $\{q_2\}$ | $\{q_3\}$ | $\emptyset$ |
| $q_2$ | $\emptyset$ | $\emptyset$ | $\{q_1\}$ |
| $q_3$ | $\emptyset$ | $\emptyset$ | $\emptyset$ |

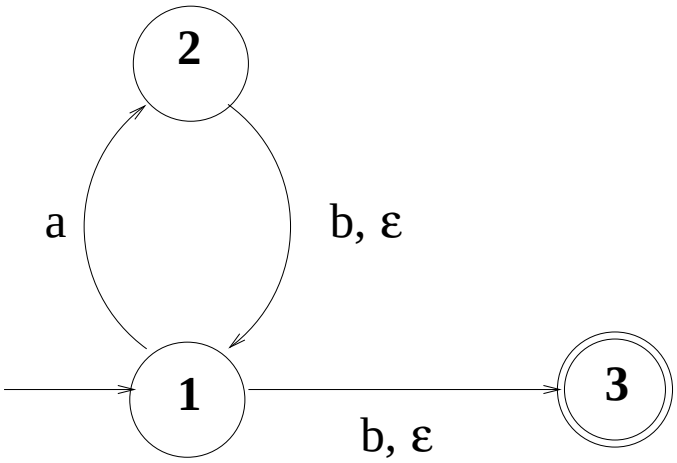
   Convert this NFA to a DFA. Show work clearly.

2. Convert the following NFA to a DFA. The set of states, $Q$, is $\{q_0, q_1, q_2\}$. The initial state is $q_0$ and the accepting state is $q_1$. The alphabet is $\{a, b\}$.

| | a | b | $\varepsilon$ |
|---|---|---|---|
| $q_0$ | $\{q_1, q_2\}$ | $\emptyset$ | $\{q_2\}$ |
| $q_1$ | $\{q_0\}$ | $\{q_1\}$ | $\emptyset$ |
| $q_2$ | $\emptyset$ | $\emptyset$ | $\{q_0\}$ |

   Show work clearly.

3. Convert the following NFA to a DFA. The set of states, $Q$, is $\{1, 2, 3\}$. The initial state is 1 and the accepting state is 3. The alphabet is $\{a, b\}$.

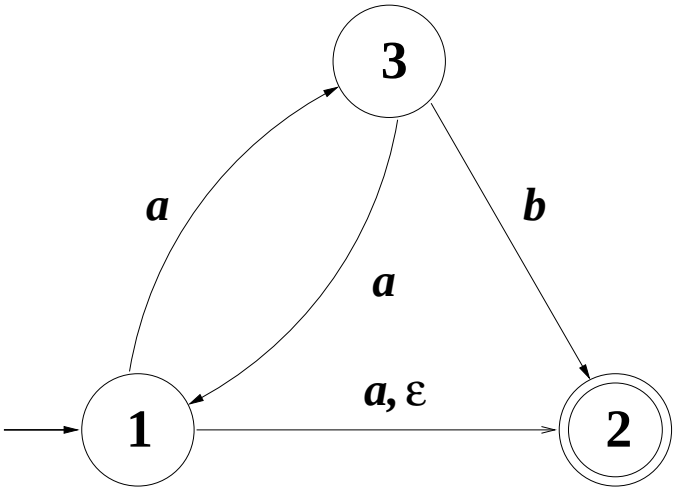




*see next page*

4. Consider the following NFA. The set of states, $Q$, is $\{1,2,3\}$. The initial state is 1 and the accepting state is 2. The alphabet is $\{a,b\}$.

| | a | b | $\varepsilon$ |
|---|---|---|---|
| 1 | $\{2,3\}$ | $\{\}$ | $\{2\}$ |
| 2 | $\{\}$ | $\{\}$ | $\{\}$ |
| 3 | $\{1\}$ | $\{2\}$ | $\{\}$ |




Convert this NFA to a DFA. Show work clearly.