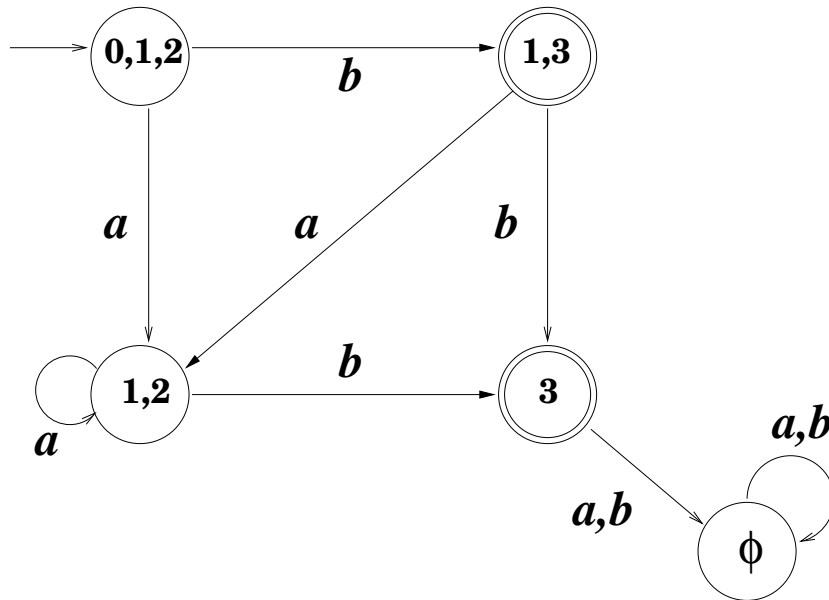# CSI 409: Conversion of NFAs to DFAs
Solutions to the sample problems

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	ϵ
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.

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 $\{a, b\}$.
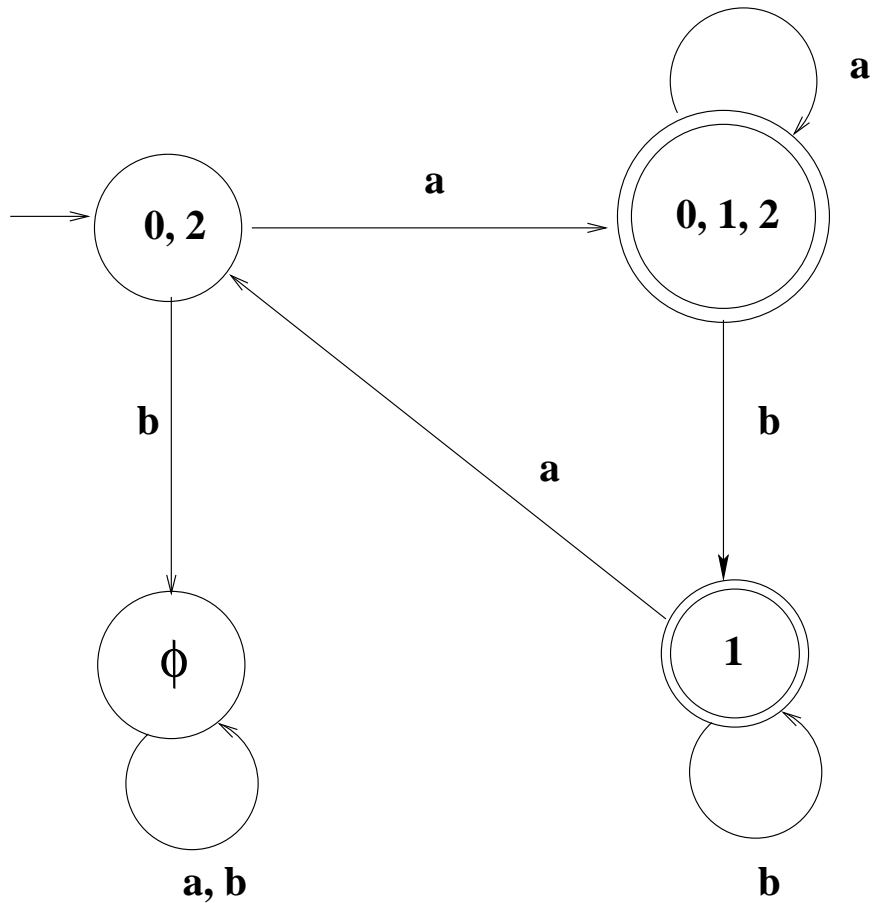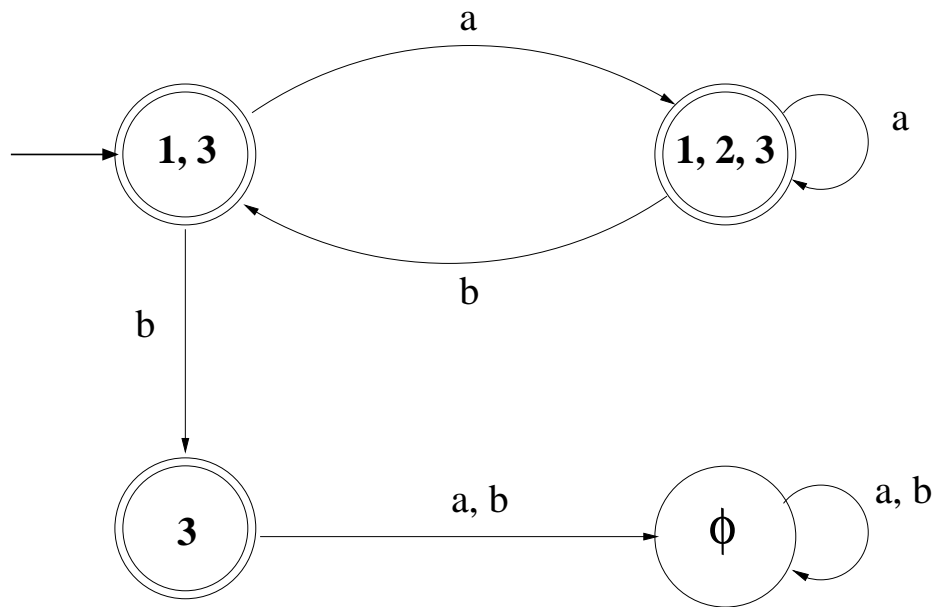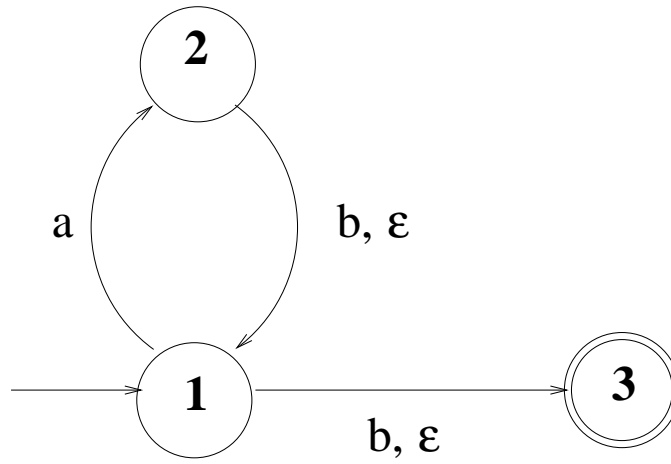
	a	b	ϵ
q_0	$\{q_1, q_2\}$	$\emptyset$	$\{q_2\}$
q_1	$\{q_0\}$	$\{q_1\}$	$\emptyset$
q_2	$\emptyset$	$\emptyset$	$\{q_0\}$

a

a

0, 2   **0, 1, 2**

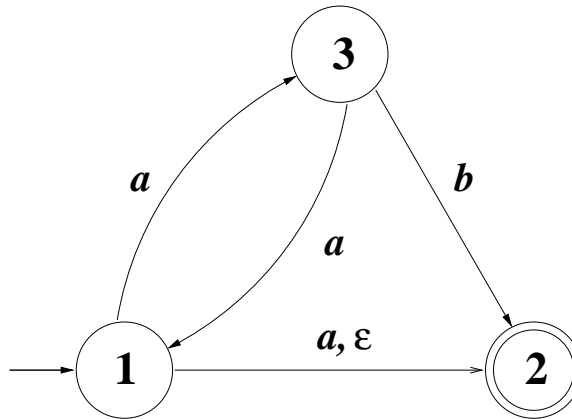b   b

a

Ø   **1**

a, b   **b**

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 $\{a, b\}$.

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	ϵ
1	$\{2,3\}$	$\{\}$	$\{2\}$
2	$\{\}$	$\{\}$	$\{\}$
3	$\{1\}$	$\{2\}$	$\{\}$

Convert this NFA to a DFA. Show work clearly.