CIT 596 Homework 1

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When I felt that it would clarify my process, I've included two or more DFAs for the exercises below. In any case where more than one DFA exists for an exercise, the DFA which provides the answer to the exercise is the last one listed, in alphabetical order.

1   Exercise 1.4

1.1   Exercise 1.4 e

Create a DFA that accepts the language $\{\omega \mid \omega$ starts with an a and has at most one $b\}$.

(a) A accepts $\{\omega \mid \omega$ starts with an $a\}$ (b) B accepts $\{\omega \mid \omega$ has at most one $b\}$
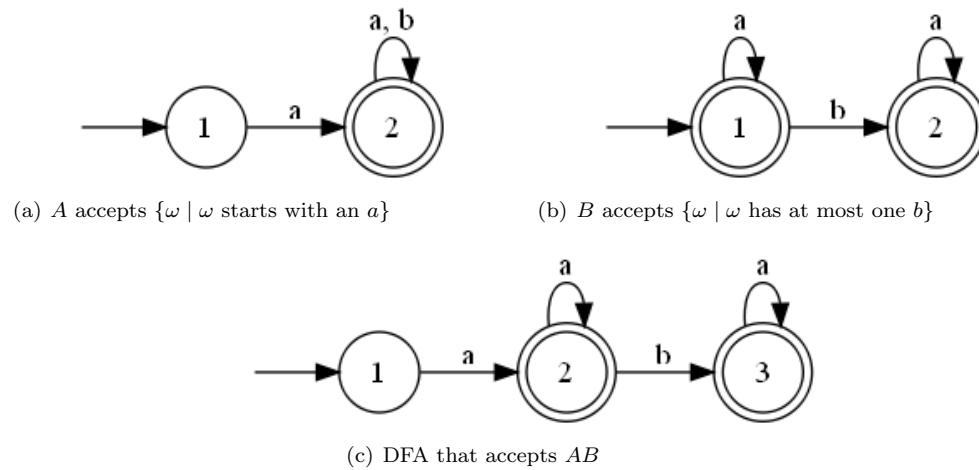
(c) DFA that accepts AB

Figure 1: DFA for Exercise 1.4e

1.2 Exercise 1.4 f

Create a DFA that accepts the language $\{\omega \mid \omega$ has an odd number of a's and ends with a $b\}$.

(a) *A* accepts $\{\omega \mid \omega$ has an odd number of a's$\}$

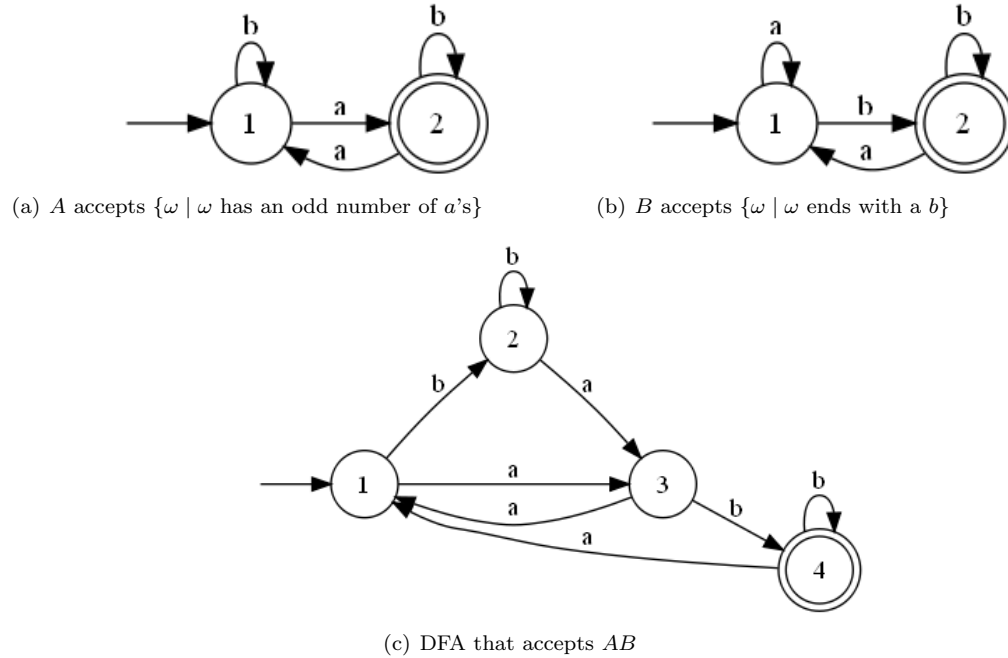(b) *B* accepts $\{\omega \mid \omega$ ends with a $b\}$

(c) DFA that accepts *AB*

Figure 2: DFA for Exercise 1.4f

1.3 Exercise 1.4 g

Create a DFA that accepts the language $\{\omega \mid \omega$ has an even length and an odd number of a's$\}$.

(a) *A* accepts $\{\omega \mid \omega$ has an even length$\}$

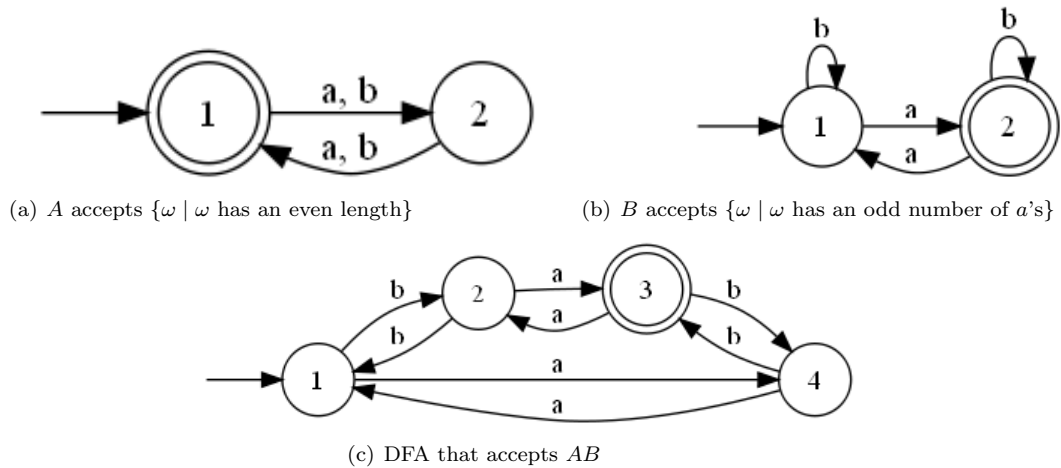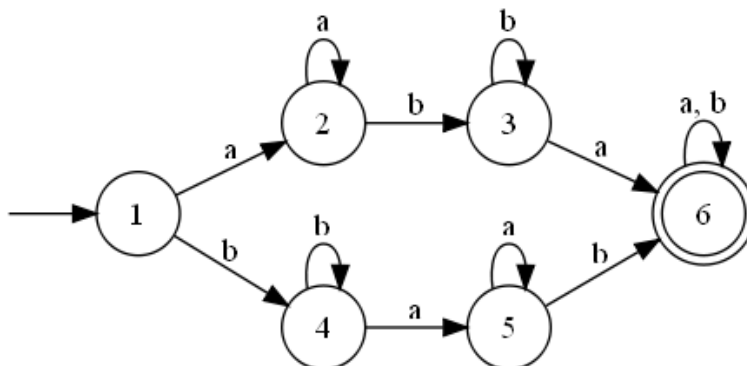(b) *B* accepts $\{\omega \mid \omega$ has an odd number of a's$\}$
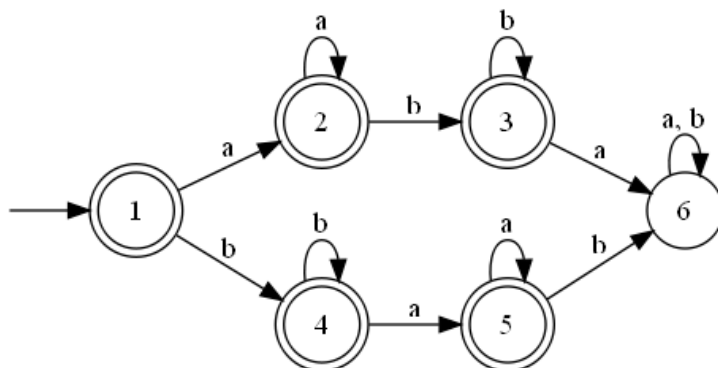
(c) DFA that accepts *AB*

Figure 3: DFA for Exercise 1.4g

2 Exercise 1.5

2.1 Exercise 1.5 c

Create a DFA that accepts the language $\{\omega \mid \omega$ conains neither the substrings ab nor $ba\}$.

(a) A accepts $\{\omega \mid \omega$ contains ab and $ba\}$

(b) DFA that accepts $\overline{A}$

Figure 4: DFA for Exercise 1.5c

2.2   Exercise 1.5 e

Create a DFA that accepts the language $\{\omega \mid \omega$ is any string not in $(ab^\star)^\star\}$.

(a) A accepts $\{\omega \mid \omega$ is in $(ab^\star)^\star\}$ (b) DFA that accepts $\overline{A}$
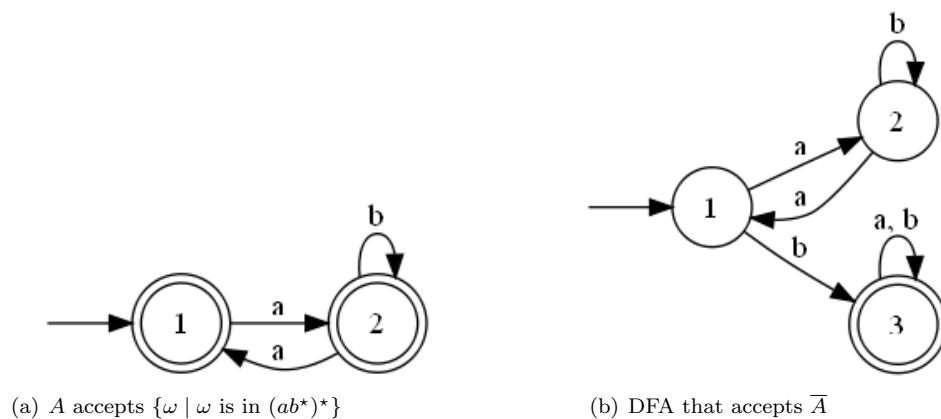
Figure 5: DFA for Exercise 1.5e

2.3   Exercise 1.5 f

Create a DFA that accepts the language $\{\omega \mid \omega$ is any string not in $a^\star \bigcup b^\star\}$.

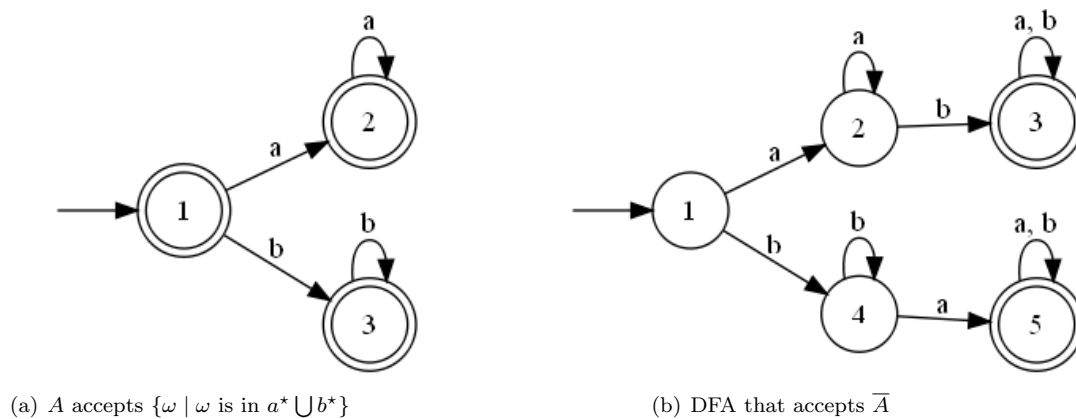(a) A accepts $\{\omega \mid \omega$ is in $a^\star \bigcup b^\star\}$ (b) DFA that accepts $\overline{A}$

Figure 6: DFA for Exercise 1.5f

3 Exercise 1.6

3.1 Exercise 1.6 c

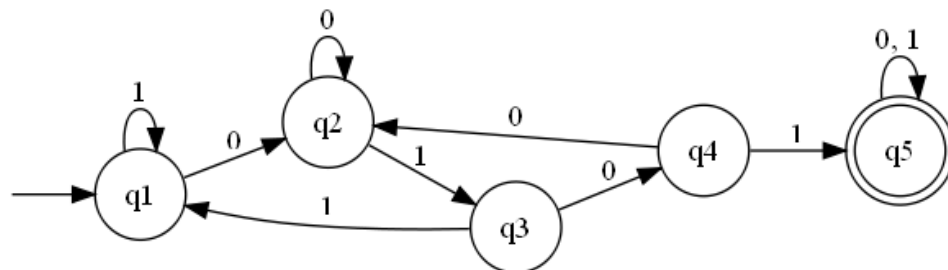Create a DFA that accepts the language $\{\omega \mid \omega \text{ contains } 0101\}$.

Figure 7: DFA for Exercise 1.6c

3.2 Exercise 1.6 e

Create a DFA that accepts the language $\{\omega \mid \omega \text{ starts with } 0 \text{ and has an odd length or } \omega \text{ starts with } 1 \text{ and has an even length}\}$.
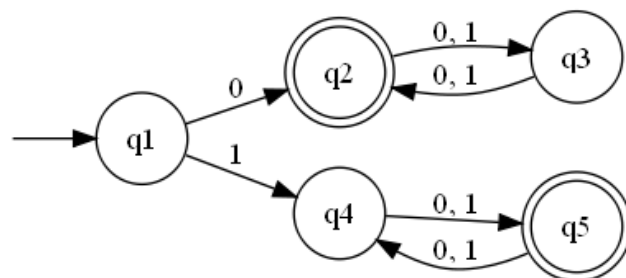

Figure 8: DFA for Exercise 1.6e

3.3 Exercise 1.6 g

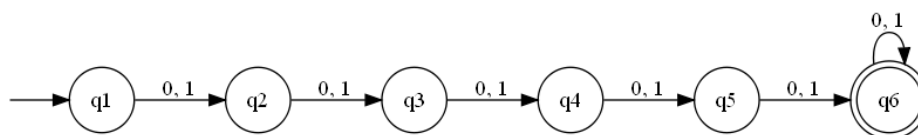Create a DFA that accepts the language $\{\omega \mid \text{ the length of } \omega \text{ is at least } 5\}$.

Figure 9: DFA for Exercise 1.6g

3.4 Exercise 1.6 i

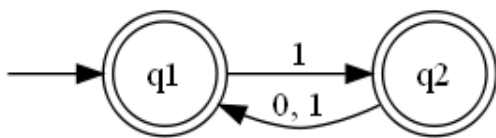Create a DFA that accepts the language $\{\omega \mid$ every odd position of ω is a 1$\}$.

Figure 10: DFA for Exercise 1.6i

3.5 Exercise 1.6 j

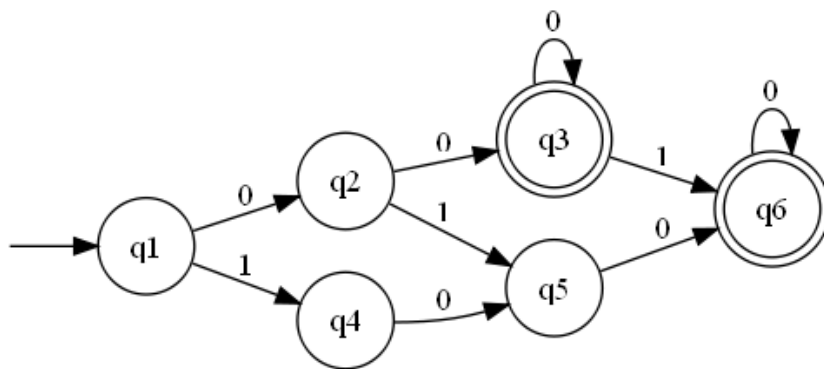Create a DFA that accepts the language $\{\omega \mid$ contains at least two 0s and at most one 1$\}$.

Figure 11: DFA for Exercise 1.6j

4
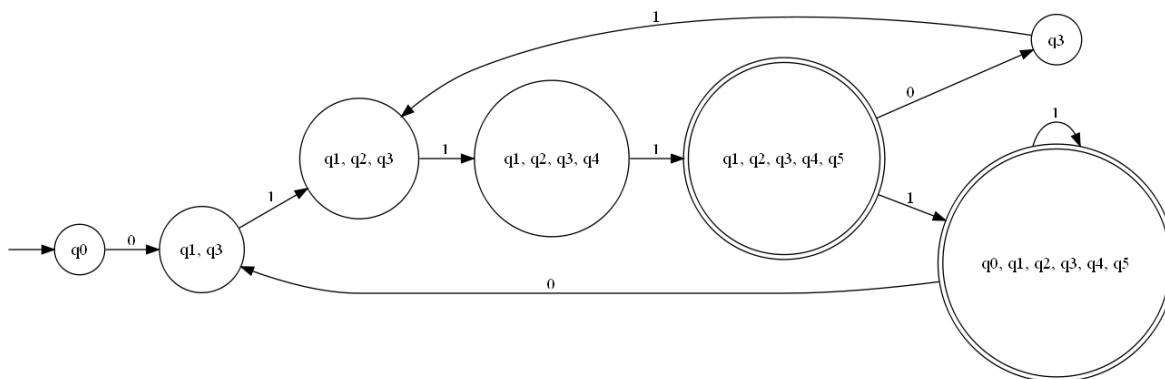
Convert the given NFA (omitted) to a DFA.
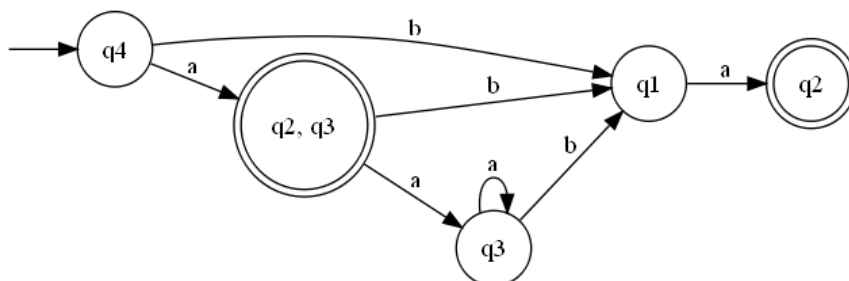
Figure 12: DFA for Question 4

5

Convert the given NFA (omitted) to a DFA.

Figure 13: DFA for Question 5