CSCI 450 Fall 2024
Homework 2

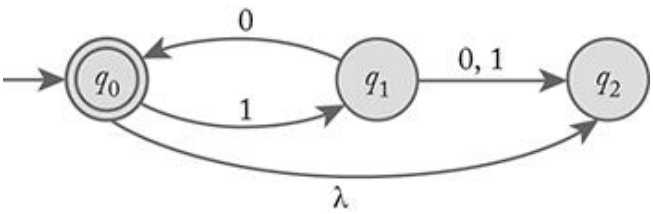
Problem 1: (3 pts) For Σ = {*a*, *b*}, construct DFA's that accept the sets consisting of all the strings
1) with <u>exactly one *a*</u> (e.g. bbbabb, etc.)
2) with <u>at least one *a*</u> (e.g. bbbaaabbbab, etc.)
3) that contain <u>either *ab* or *bba*</u> (or both) as substrings

Problem 2: (1 pt) Draw a DFA for the following language

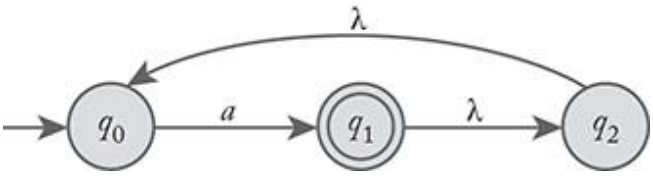
$L = \{w_1abw_2: w_1 \in \{a, b\}^*, w_2 \in \{a, b\}^*\}$

Problem 3: (2 pts) Fill in the blanks based on the following NFA:

$\delta^*(q_0, 1010)$ = _____ and $\delta^*(q_1, 00)$ = _____



Problem 4: (2 pts) Answer questions based on the following NFA:
1) What language does it accept? L = _____
2) What is the <u>complement</u> of the language accepted by the NFA? _____



Problem 5: (2 pts) Convert the NFA defined by
$\delta(q_0, a) = \{q_0, q_1\}$, $\delta(q_1, b) = \{q_1, q_2\}$, $\delta(q_2, a) = \{q_2\}$, $\delta(q_0, \lambda) = \{q_2\}$
with initial state q_0 and final state q_2 into an equivalent DFA.

First draw the NFA, and then convert it to DFA (draw the DFA).