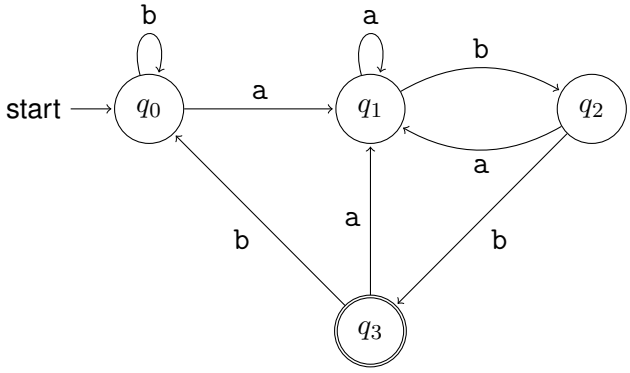
CPSC 351 — Tutorial Exercise #2
Additional Practice Problems

About These Problems

These problems will not be discussed during the tutorial, and solutions for these problems will not be made available. They can be used as "practice" problems that can help you practice skills considered in the lecture presentation for Lecture #2, or in Tutorial Exercise #2.

Practice Problems

These problems concern a deterministic finite automaton M that has alphabet $\Sigma = \{\mathtt{a}, \mathtt{b}\}$ and that can be represented as follows.



1. Give the set Q of ***states*** in M and identify the ***start state***.
2. Give the set F of ***accepting states*** in M.

3. Describe the ***transition function*** $\delta : Q \times \Sigma \to Q$ by completing the following ***transition table***.

	a	b
q_0		
q_1		
q_2		
q_3		

4. Trace the execution of M on each of the following input strings — listing the sequence of states that are visited as symbols in the string are seen and processed, and stating whether the string is in the language of M.

   (a) λ
   (b) `a`
   (c) `b`
   (d) `ab`
   (e) `ba`
   (f) `abb`
   (g) `aabba`
   (h) `aabbb`
   (i) `abbab`
   (j) `aabbab`
   (k) `aaaabbb`

5. Give a ***brief*** description, in simple English, for each of the following subsets of $\Sigma^\star$.

   (a) $\{\omega \in \Sigma^\star \mid \delta^\star(q_0, \omega) = q_0\}$
   (b) $\{\omega \in \Sigma^\star \mid \delta^\star(q_0, \omega) = q_1\}$
   (c) $\{\omega \in \Sigma^\star \mid \delta^\star(q_0, \omega) = q_2\}$
   (d) $\{\omega \in \Sigma^\star \mid \delta^\star(q_0, \omega) = q_3\}$

   Note: It might be helpful to think of how the strings, whose processing goes to each of these states, can *end*.

6. Use your answer for the previous question to give a ***brief*** description, in simple English, of the language of (this particular DFA) M.

7. Prove that your answer for the above question is correct.