CSCI 340 — Homework 3

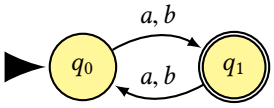
Dr. Schwartz

1. Build an FA that accepts only the language of all words with b as the second letter. Show both the picture and the transition table for this machine and find a regular expression for the language.

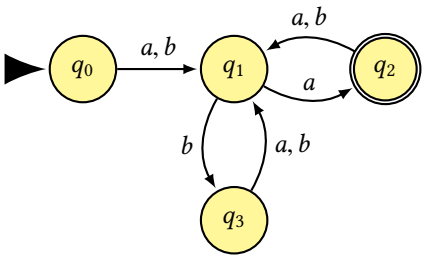
2. Find two FA's that satisfy these conditions: Between them they accept all words in $(\mathbf{a} + \mathbf{b})^*$, but there is no word accepted by both machines.

3. Describe the languages accepted by the following FA's:

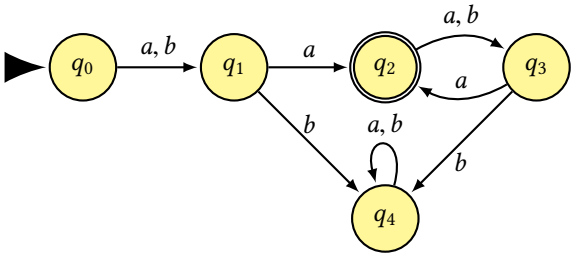
   (a)



   (b)

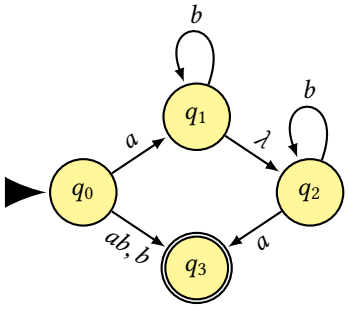


   (c)

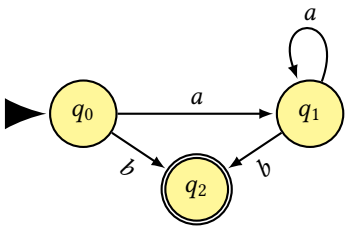


4. For each of the ten following words, decide which of the 6 machines below accept the given word: λ a b aa ab aba $abba$ bab $baab$ $abbb$

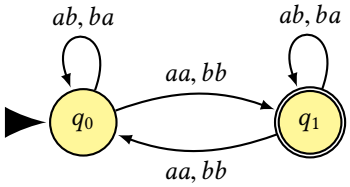
(a)



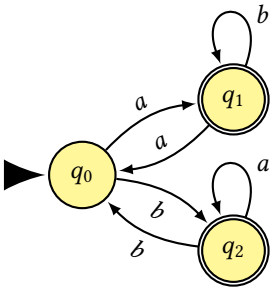
(b)



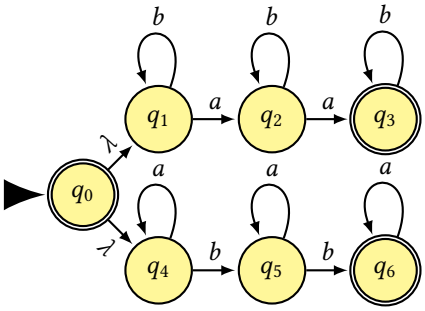
(c)



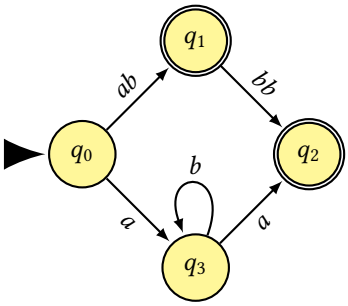
(d)



(e)



(f)



5. Build a TG that accepts the language L_1 of all words that begin and end with the same double letter, either of the form $aa \ldots aa$ or $bb \ldots bb$.
   Note: aaa and bbb are not words in this language

6. A student walks into a classroom and sees on the blackboard a diagram of a TG with two states that accepts only the word λ. The student reverses the direction of exactly one edge, leaving all other edges, labels, initial states, and final states the same. But now the new TG accepts the language $\mathbf{a}^*$. What was the original machine?