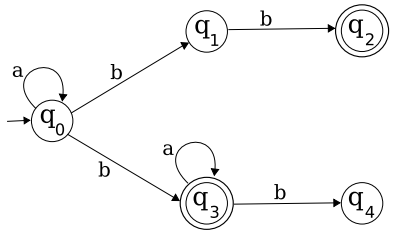
CPSC 229, Fall 2008 — Homework #7

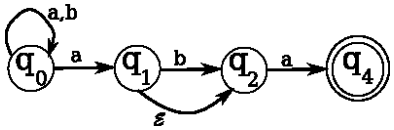
This homework is due in class on Friday, November 14.

1. For each of the following NFAs, use the algorithm from Section 3.5 to construct a DFA that accepts the same language:

a)



b)



2. For **each** of the NFAs in the previous problem, find a regular expression that generates the same language that is accepted by the NFA. In each case, explain your answer. You do not have to use any particular algorithm to find the regular expression.

3. For each of the following regular expressions over the alphabet $\Sigma = \{a, b, c\}$, use the algorithm from Section 3.6 to construct an NFA that accepts the language generated by the regular expression:

a) $(a + bc)^*$ **b)** $a(b + c)^*a$

4. Use the Pumping Lemma to show that each of the following languages is **not** regular:

a) $L_1 = \{a^n b a^m b a^{n+m} \mid n, m \in \mathbb{N}\}$

b) $L_2 = \{w \in \{0, 1\}^* \mid w = w^R\}$

c) $L_3 = \{w \in \{a, b\}^* \mid n_a(w) > n_b(w)\}$

5. Suppose that L is a regular language. Then L^R is also a regular language (where $L^R = \{w^R \mid w \in L\}$). To show this: Let M be a DFA such that $L = L(M)$. To get an NFA that accepts L^R, reverse the direction of all the arrows in M — and then decide what else you need to do, and explain in words why it works.