CSE 2001: Introduction to the Theory of Computation
Tutorial 3, Oct 3, 7 pm

**Problems:**

1. Design a DFA for the language $L$ given by $L = \{w | w \in \{0,1\}^*, w$ ends in 0 and does not contain the substring $11\}$. Try to use as few states as you can.

2. Consider the NFA shown in Figure 1.

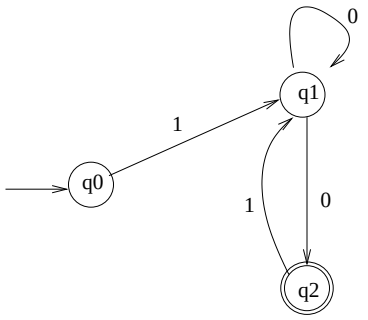


Figure 1: NFA transition diagram for question 4

   (a) Convert the NFA to a DFA using the procedure used in the proof of equivalence of DFA's and NFA's.

   (b) Convert the NFA to a regular expression using the algorithm covered in class.

3. Show that if $L$ is a regular language, then so is $L^R$. The superscript denotes that $L^R$ contains the reverse of all strings in $L$.

4. Show that if $L$ is a regular language, then so is $L'$ formed by taking only the words starting with $a$ and deleting it:
$$L' = \{w \in \Sigma^* | aw \in L\}.$$

5. This question is about regular expressions. Prove the formula
$$(0 \cdot 0^* \cdot 1)^* \cdot 1 = 1 \cup 0 \cdot (0 \cup 1 \cdot 0)^* \cdot 1 \cdot 1.$$

6. Given a DFA, how can you determine if the language it accepts is finite or infinite?