CSE 322: Introduction to Formal Models in Computer Science
Assignment #2
October 10, 2005
due: Monday, October 17

1. Exercise 1.14(b) [1st Ed: Exercise 1.10(b)]. Let M' be the NFA that results from swapping the accept and nonaccept states of M. For your example, state precisely what $L(M)$ and $L(M')$ are, and why these languages are not complementary.

2. Exercise 1.16(b) [1st Ed: Exercise 1.12(b)]. You need only give the state diagram, and just that portion of it reachable from its start state.

3. In Example 1.33 [1st Ed: Example 1.15] on page 52, label the start state q, the two states at the top of the diagram r_0 and r_1 from left to right, and the three states at the bottom s_0, s_1, and s_2 starting with the accept state and going clockwise around the cycle.

    (a) Use the construction given in Theorem 1.39 [1st Ed: Theorem 1.19] to convert this NFA into an equivalent DFA. You need only give the state diagram, and just that portion of it reachable from its start state.

    (b) Explain how your DFA from part (a) relates to the construction given in the proof of Theorem 1.25 [1st Ed: Theorem 1.12]. What does Example 1.33 [1st Ed: Example 1.15] have to do with the union operation?

4. Exercise 1.8(b) [1st Ed: Exercise 1.6(b)].

5. Let L be the language accepted by the NFA of Example 1.33 [1st Ed: Example 1.15] on page 52. Use the construction given in the proof of Theorem 1.47 [1st Ed: Theorem 1.23] to give the state diagram of an NFA recognizing the language $L \circ L$.

6. Problem 1.31 [1st Ed: Problem 1.24]. This is the result you used without proof in a problem on Assignment 1. Hint: Design an NFA for $A^{\mathcal{R}}$. Why is an NFA convenient for this?