Problem Set 3 — Due Wednesday, April 21, 1999

Problem 1.

(a) Page 85, Exercise 1.12 (b)

(b) Page 86, Exercise 1.14, part (b).

(c) Page 86, Exercise 1.16, part (b).

Problem 2. Page 89, Problem 1.31.

Problem 3. Page 89, Problem 1.32.

Problem 4. Page 90, Problem 1.41.

Problem 5. Construct a family of languages L_n, $n \geq 1$, such that there is a DFA M_n having n final states which accepts L_n but there is *no* DFA having $n-1$ final states which accepts L_n. Prove that L_n has this property.

***Problem 6.** *Extra credit.* Construct a family of languages $\{L_n : \; n \geq 1\}$ (over a common alphabet) such that the smallest DFA for L_n is exponentially larger than the smallest NFA for L_n. Prove that your family of languages has this property. *(If you solve this problem please turn it in in class on Wednesday, on a separate sheet of paper. Only turn in a fully correct and proven answer.)*