

Problem Set 3 — Due January 24, 2002

Problem 1. Page 85, Exercise 1.12.

Problem 2. Prove that the NFA-acceptable languages are closed under reversal.

Problem 3. Page 86, Exercise 1.16, part (b).

Problem 4. Let $M = (Q, \Sigma, \Delta, q_0, F)$ be an NFA. We say that M accepts a string x in the *all-paths sense* if every computation of M on x ends in a state in F ; that is, $(q_0, x, q) \in \Delta^*$ implies $q \in F$. Let $L_u(M)$ denote the set of all $x \in \Sigma^*$ such that M accepts x in the all-paths sense. Show that L is regular iff $L = L_u(M)$ for some NFA M .

Problem 5. [Challenging.] Let L be a language over Σ and define the language $\text{PAL}(L) = \{x \in \Sigma^* : xx^R \in L\}$. If L is DFA-acceptable, is $\text{PAL}(L)$ necessarily DFA-acceptable? Prove your answer.