

There are five problems labeled A–E. The first two problems are routine. If you need more practice, then do more problems like them from the book, or talk to me or the prefect.

A. Do Exercise 1.7c in our textbook (which is about even 0s or two 1s).

B. Do Exercise 1.16a (which is about converting an NFA to a DFA).

The last three problems are about the quotient operation on languages, which is defined in problem 1.45. This concept recurs a few times throughout the course, and it leads to some pretty interesting results. Actually, it is quite confusing! Problem C deals with a special case. Problem D gives you an idea of why it is a “quotient” but not perfectly. Problem E is challenging.

C. If  $A = \Sigma^*$ , then what is  $A/B$ ? (Hint: There are two possibilities, depending on  $B$ .)

D. Find an example of two infinite languages  $A$  and  $B$  such that  $(A/B)B = A$ . Also find an example of two languages  $A$  and  $B$  such that  $(A/B)B \neq A$ .

E. Do problem 1.45 (which is about  $A/B$ ). Your solution will probably involve some kind of description of a DFA or NFA for  $A/B$ . Your solution should explain why the automaton accepts all strings in  $A/B$  and why it rejects all strings that are not in  $A/B$ .