

ASSIGNMENT FROM CHAPTER 2 OF SIPSER

Exercises

- 2.1 (parse trees and derivations),
- 2.9 (CFG for a specified language),
- 2.11 (CFG to PDA, either as in Sipser or as in class),
- 2.13 (describe a CFL, show it is not regular),
- 2.16 (closure properties of CFLs under the regular operations).

Problems

- 2.22 (show that a language is context-free),
- 2.27a (show that a CFG is ambiguous),
- 2.31 (show that a language is not context-free [try $w = 0^\ell 1^{2^\ell} 0^\ell$]),
- 2.34 (minimum pumping length for a CFL),
- 2.36 (the converse of the pumping lemma fails) [Use the language

$$F = \{a^i b^j c^k d^\ell : i, j, k, \ell \geq 0 \text{ and if } i = 1 \text{ then } j = k = \ell\}.$$

Use the pumping lemma to show that $F \cap \mathbf{ab^*c^*d^*}$ is not a CFL. Explain why this shows that F is not a CFL. Show that 2 (or even 1) works as a pumping length for F .]

- 2.43a (the scramble of a regular language on two letters is a CFL [some FA recognizes the regular language; describe a corresponding PDA that recognizes the scramble]).