

CSE 4083/5210 Formal Languages and Automata  
asgn07      Assignment #7      Chapter 7 (CFL/PDA)  
Due: Fri, 23 Feb 2024

**Reading.** Read Chapter 7: “Pushdown Automata” (omit section 7.4). Read Section 8.2: “Closure Properties and Decision Algorithms.”

**Assignment.** Do some of the following exercises.

- Section 7.1: Problems 3abcde, 4, 6, 12, 13
- Section 7.2: Problems 1, 2, 3
- Section 7.3: Problems 1, 2, 3, 4, 6, 7, 10, 11
- *Section 8.1: CFL pumping lemma next week*
- Section 8.2: Problems 1, 5, 6, 8, 9, 13

We are especially interested in clear exposition and proof technique. (Some solutions sketches are in the back of the book.)

**Submission.** Write up the solutions. You may use pen and paper, plain text, or L<sup>A</sup>T<sub>E</sub>X. Produce a PDF document, and submit it on Canvas by the due date before the end of the day.

The due date is for the completed problem set. You should read the material in advance, and start thinking and working on the problems in advance, so that you can ask questions in class.

Collaborating is encouraged; no individual grade for the homework will be used in determining the individual course grade (that’s what the tests are for). Copying just wastes everyone’s time; it is quality that is important not quantity. Copying is not practicing. Of course, some individual may require much more practice than others to achieve the same level of competency on the tests.

**Questions.** If you have questions about how to do the problems, you are welcome to send me e-mail: [ryan@fit.edu](mailto:ryan@fit.edu). Students may be called upon to share and explain their progress on the exercises during class.

**Assessment.** Ultimately the written proofs, your choice of exercises, and your participation in answering and *asking* questions, will influence your course grade.

## Objectives.

1. Describe the components of a nondeterministic pushdown automaton
2. State whether an input string is accepted by a nondeterministic pushdown automaton
3. Construct a pushdown automaton to accept a specific language
4. (§7.2) Given a context-free grammar in Greibach normal form, construct the corresponding pushdown automaton (Theorem 7.1, page 193)
5. Given a *any* context-free grammar, construct the corresponding pushdown automaton
6. Describe the differences between deterministic and nondeterministic pushdown automata
7. Describe the differences between deterministic and general context-free languages