CSE 4083/5210 Formal Languages and Automata
asgn06   Assignment #6   Chapter 6 (CFL/Grammars)
Due: Fri, 16 Feb 2024

Reading. Read Chapter 6: "Simplification of Context-Free Grammars and Normal Forms."

Assignment. Do some of the following exercises from Linz 6th. (They have the same numbers in Linz 7th.) All on the new introductory exercises in Linz 7th are recommended.

- Section 6.1: Problems 1–11, 17–19, 23, 24.

- Section 6.2: Problems 1–5, 8, 10–13.

- Section 6.3: Problems 1, 2, 4.

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 LaTeX. 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 determined 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`. 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.   At the conclusion of the chapter, the student should be able to the following.

1. Simplify a context-free grammar by removing useless (non-productive or unreachable) productions

2. Simplify a context-free grammar by removing lambda-productions

3. Simplify a context-free grammar by removing unit-productions

4. (§6.2) Determine whether or not a context-free grammar is in Chomsky normal form (Definition 6.4)

5. (§6.2) Transform a context-free grammar into an equivalent grammar in Chomsky normal form (Theorem 6.6)

6. (§6.2) Determine whether or not a context-free grammar is in Greibach normal form

7. (§6.3) Determine whether or not a string is in a CFL using the CYK algorithm