CSE 4083/5210 Formal Languages and Automata
Assignment #10
Due: Fri, 28 Oct 2022

Reading. Read Chapter 8: "Properties of Context-Free Languages." There are several pre-recorded lectures pertaining to this assignment. They can be found following the links on the grid of notes, or on the Canvas LMS.

Assignment. Do some of the following exercises.

- 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 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.

1. State the closure properties of context-free languages

2. Prove that context-free languages are closed under union, concatenation, and star-closure

3. Prove that context-free languages are not closed under either intersection or complementation

4. Describe a membership algorithm for context-free languages

5. Describe an algorithm to determine if a context-free language is empty

6. Describe an algorithm to determine if a context-free language is infinite

7. Recognize the difficulty in proving that an algorithm cannot exist