Prep Work 9 - Pumping Lemma

CS 234

due March 31, before class

0 Introduction

This assignment has 1 part: the pumping lemma

This assignment is to be completed individually, but feel free to collaborate according to the course's external collaboration policy (which can be found in the syllabus).

The deliverables consist of one `.pdf` file. The deliverables should be submitted electronically by the deadline. Put any attribution text in the `.pdf` file.

Every file should be named like `FLast_cs234_pX.ext` where `F` is your first initial, `Last` is your last name, `X` is the assignment number, and `ext` is the appropriate file extension. For example, Liron Cohen's `.pdf` file should be given the name `LCohen_cs234_p9.pdf`. (Liron Cohen is researcher in constructive/computable logic and mathematics. When I was an undergrad, she taught me about ancestral logic!)

1 Pumping Lemma

Read chapter 11 in the textbook. Then complete the following tasks in your `.pdf` submission. Clearly label your responses with the task number.

1. In your own words, describe the pigeonhole principle.
2. How is the pigeonhole principle used in the proof of the pumping lemma?
3. In the statement of the pumping lemma in Theorem 11.2, a string w from a given regular language is divided up into 3 parts xyz. In your own words, what are the 3 properties that the pumping lemma attributes to these parts?
4. The pumping lemma is about string membership in a regular language. How can the pumping lemma be applied to determine when a language is *not* regular?
5. In Theorem 11.5, there is an edge case. In your own words, how is the edge case dealt with in the proof?
6. In your own words, why does Theorem 11.6 have to be careful about how many times the string is pumped?