

## CS350 – Lab 9

**Due Date: April 11**

**Purpose:** The syntax of programming languages can be expressed with context free grammars so they are central to compilers. We have also seen pushdown automata which we will later see are equivalent in computation to cfg's. The purpose of this lab is for you to express languages using these models and to begin to examine their properties.

**Knowledge:** This lab will help you become familiar with the following content knowledge:

- How to express languages using both cfg and pda models.

**Task:** Follow the steps in this lab carefully to complete the assignments.

### Assignment 1:

In JFLAP, create and test grammars for the following languages over the alphabet  $\Sigma = \{a, b, c\}$  :

1. All strings with exactly two a's.
2. All strings with no more than two a's.
3.  $L = \{a^n b^{2n} \mid n \geq 0\}$
4.  $L = \{a^n b^m c^{n+m} \mid n \geq 0\}$

**Criteria for Success:** You have thoroughly tested each grammars with strings both in and not in the language and gotten the correct results.

### Assignment 2:

In JFLAP, create and test pushdown automata for the following languages over the alphabet  $\Sigma = \{a, b, c\}$  :

1.  $L = \{a^n b^m c^{n+m} \mid n \geq 0\}$
2.  $L = \{w \mid \text{number of a's in } w < \text{number of b's in } w\}$

**Criteria for Success:** You have thoroughly tested each pda with strings both in and not in the language and gotten the correct results.

Submit your JFLAP files in Canvas for grading.