

## Worksheet 5: Context-Free Languages

Computer Science 311: Computational Structures  
Spring 2016

**Exercise 1** Draw a pushdown automaton that decides  $\{ww^R \mid w \in \{0,1\}^* \text{ and } w^R \text{ is the reverse of } w\}$ .

**Exercise 2** Write a CFG that describes the language of all well-defined arithmetic expressions using the binary operators  $+$  and  $\times$ . Allow users to specify operator precedence using parentheses.