

Context-Free Grammars

CS 311, Fall 2015

Exercise 1 Write a context-free grammar for each of the following languages.

a) $\{w \mid w = a^n b^{3n}, n \geq 0\}$

b) $\{a^i b^j c^k \mid j > i + k\}$

c) $\{a^n b^m c^{2n} \mid n, m \geq 0\}$

Exercise 2 Write a context-free grammar for each of the following languages.

a) $\{w \mid w \text{ contains at least three 1s}\}, \Sigma = \{0, 1\}$

b) $\{w \mid \text{The length of } w \text{ is odd}\}, \Sigma = \{a, b\}$

c) $\{w \mid w = a^i b^j c^k, i = j\}, \Sigma = \{a, b, c\}$