

CSE 322: Introduction to Formal Models in Computer Science  
Assignment #5  
November 3, 2006  
due: Monday, November 13

1. For the context-free grammar  $G_4$  given in Example 2.4 [1st Ed: Example 2.3], show a parse tree for the string  $a \times (a \times a) \times (a + a)$ .
2. Exercise 2.9.
3. Give a context-free grammar  $G$  such that

$$L(G) = \{w \in \{0, 1\}^* \mid w \text{ has an equal number of 0s and 1s}\}.$$

You need not turn in a proof of correctness, though it would be good reassurance for yourself to do such a proof.

4. Exercise 2.16 [1st Ed: Problem 2.15].
5. Exercise 2.17 [1st Ed: Problem 2.16].
6. Convert the context-free grammar  $G_4$  given in Example 2.4 [1st Ed: Example 2.3] into Chomsky normal form, using the procedure from the class handout. Show a parse tree for the string  $(a + a) \times a$  in your Chomsky normal form grammar.