

Problem Set 4 — Due 29 August 2000

Problem 1. Give a context-free grammar for the language

$$L = \{a^n b^m : n \neq 2m\}$$

Is your grammar ambiguous?

Problem 2. Give a context-free grammar for the language

$$L = \{w \in \{0, 1\}^* : w \text{ contains the same number of 1's and 0's}\}$$

Is your grammar ambiguous?

Problem 3. Prove that the context-free languages are closed under reversal.

Problem 4. Prove that $L = \{a^i b^j c^k : j = \max\{i, k\}\}$ is not context free.

Problem 5. Prove that $L = \{b_i \# b_{i+1} : b_i \text{ is } i \text{ in binary, } i \geq 1\}$ is not context free.