

Problem Set 5 — Due 11 am on Monday, February 7, 2005

Problem 1. Page 86, Exercise 1.17, parts b and c.

Part b. $L = \{www : w \in \{a,b\}^*\}$.

Part c. $L = \{a^{2^n} : n \geq 0\}$.

Problem 2. Decide if the following languages are regular or not, proving your answers either way.

Part a. $L = \{0^n 1^m 0^n : m, n \geq 0\}$

Part b. $L = \{w \in \{0,1\}^* : w \text{ is not a palindrome}\}$.

Part c. $L = \{w \in \{0,1,2\}^* : w \text{ has an equal number of 0's and 1's}\}$.

Problem 3. Give a context free grammar for $L = \{a^n b^m : n \neq 2m\}$. Make your grammar unambiguous— and explain why it is unambiguous.

Problem 4. Consider the grammar $S \rightarrow AA, A \rightarrow AAA \mid bA \mid Ab \mid a$.

Part a. Describe, in careful English, the language of this grammar.

Part b. Show that this grammar is ambiguous.