

COMS W3261: Theoretical Computer Science.

Instructor: Tal Malkin

Problem Set 4

Due: Thur, 02/19/09.

Reading: Chapter 1.3,1.4

1. Give regular expressions generating each of the following languages.
 - (a) $L = \{xy \mid x \text{ has an even number of 1s and } y \text{ has an even number of 0s}\}$, over the alphabet $\{0, 1\}$.
 - (b) $L = \{w \mid w \text{ does not contain two consecutive Cs}\}$ over the alphabet $\{A, B, C\}$.
2. Problem 1.21(b) in text (converting a DFA to a regular expression).
3. Prove that the following languages are not regular. You may use the pumping lemma and the closure of the class of regular languages under union, concatenation, intersection, star, and complement. All the languages are over the alphabet $\Sigma = \{0, 1\}$.
 - (a) Problem 1.46(d) in text
 - (b) $L_1 = \{www \mid w \text{ is a string in } \{0, 1\}^*\}$
 - (c) $L_2 = \{10^n 1^{2n} \mid n \geq 0\}$
 - (d) $L_3 = \{w \mid w \text{ contains twice as many 1s as 0s}\}$