

Problem Set 4

Due: Thur, 03/03/11.

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.
 - (a) Use the general procedure we saw in class (Lemma 1.55 in the text) for converting the following regular expression over the alphabet $\{a, b\}$ to an NFA: $a(abb)^* \cup b$
 - (b) Problem 1.21(a) in the text (converting a finite automaton 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.
 - (a) $L_1 = \{ \text{all balanced parenthesis} \}$ over the alphabet $\Sigma = \{(,)\}$.
 - (b) $L_2 = \{10^n 1^{2n} \mid n \geq 0\}$ over the alphabet $\Sigma = \{0, 1\}$.
 - (c) $L_3 = \{w \mid w \text{ contains twice as many 1s as 0s}\}$ over the alphabet $\Sigma = \{0, 1\}$.
 - (d) Problem 1.53 in textbook.