Homework 3

CS 390 - Spring 2009

Due: February 3, 2009

DFA State Minimization

Use the DFA minimization technique shown in class to minimize the following DFA.

![DFA Diagram]

Figure 1: DFA

Regularity

1. For each of the following languages, decide whether or not the language is regular. If you believe the language to be regular, construct a machine (or regexp) that will recognize it. If you believe the language to be non-regular, prove it, perhaps by use of the pumping lemma.
(a) $L = \{0^p 1^q 0^r | r = p + q\}$

(b) $L = \text{all palindromes, or more precisely:}$
\[
\{wxw^R | w \in \{a..z\}^* \text{ and } x \in \{a..z, \varepsilon\}\}
\]

(c) $L = \{1^k y | y \in \{0, 1\}^* \text{ and } y \text{ contains at most } k \text{ 1s, for } k \geq 1\}.$

(d) $L = \{1^k y | y \in \{0, 1\}^* \text{ and } y \text{ contains at least } k \text{ 1s, for } k \geq 1\}.$

2. Do problem 1.54 in your book.