

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.

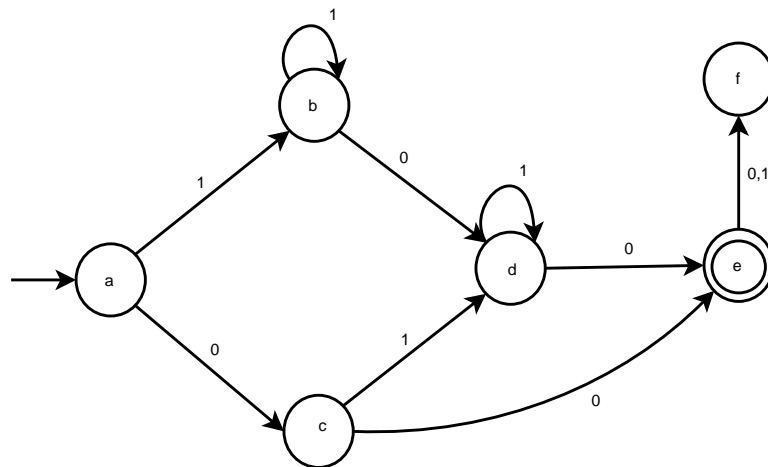


Figure 1: DFA

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) $L = \{0^p 1^q 0^r \mid r = p + q\}$
- (b) $L =$ all palindromes, or more precisely:
 $\{wxw^R \mid w \in \{a..z\}^* \text{ and } x \in \{a..z, \epsilon\}\}$
- (c) $L = \{1^k y \mid y \in \{0, 1\}^* \text{ and } y \text{ contains at most } k \text{ 1s, for } k \geq 1\}$.
- (d) $L = \{1^k y \mid y \in \{0, 1\}^* \text{ and } y \text{ contains at least } k \text{ 1s, for } k \geq 1\}$.

2. Do problem 1.54 in your book.