CS 3530: Assignment 2c

Fall 2014

Problems

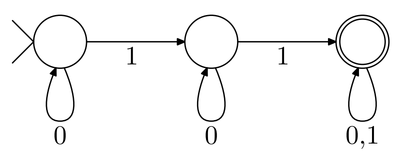
Problem 1.31 (10 points)

Problem

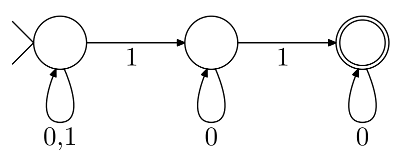
For any string $w = w_1 w_2 \cdots w_n$, the ***reverse*** of w, written $w^{\mathcal{R}}$, is the string w in reverse order, $w_n \cdots w_2 w_1$. For any language A, let $A^{\mathcal{R}} = \{w^{\mathcal{R}} : w \in A\}$. Show that if A is regular, so is $A^{\mathcal{R}}$.

Solution

non-reversed DFA



DFA reversed into NFA



Problem 1.43 (10 points)

Problem

Let A be any language. Define $DROP\text{-}OUT(A)$ to be the language containing all strings that can be obtained by removing one symbol from a string in A. Thus, $DROP\text{-}OUT(A) = \{xz : xyz \in A$ where $x, z \in \Sigma^*, y \in \Sigma\}$. Show that the class of regular languages is closed under the $DROP\text{-}OUT$ operation. Give both a proof by picture and a more formal proof by construction as in Theorem 1.47.

Solution Description

N = (Q, Σ, δ, q_0, F)
Q = {0, 1, ... , n}
Σ = {0,1}
q_0 = {0}
F = {n}
δ =

$\delta(q_n, 0) = q_n$ for all n
$\delta(q_n, 1) = q_n$ for n_{max}
$\delta(q_n, 1) = q_{n+1}$ for all $n < n_{max}$
$\delta(q_n, \varepsilon) = q_{n+1}$ for all $n < n_{max}$

Solution Diagram