Formleg mál og reiknanleiki

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skil 3

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1 Exercise 1.25 bls 88

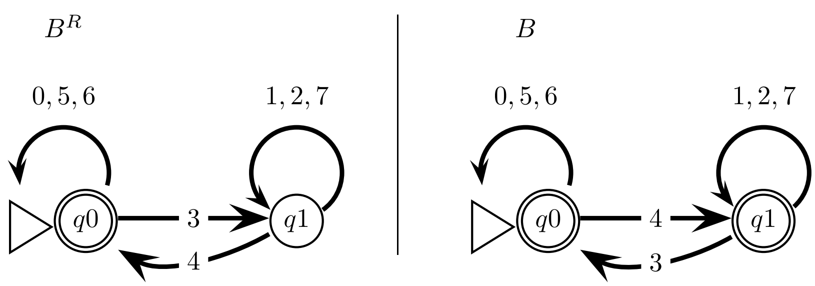
Let $\sum_3 = \left\{ \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix}, ..., \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} \right\}$

$\sum_3$ contains all size 3 columns of 0s and 1s. A string of symbols in $\sum_3$ gives three rows of 0s and 1s. Consider each row to be a binary number an let $B = \{w \in \sum_3^* |$ the bottom row of w is the sum of top two ros$\}$.

For example, $\begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix} \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix} \in B$, but $\begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix} \notin B$

Show that B is regular. (Hint : Working with B^R is easier You may assume the result claimed in Proble 1.24.)

$0 = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}, 1 = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}, 2 = \begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix}, 3 = \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix},$
$4 = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}, 5 = \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}, 6 = \begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix}, 7 = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$



2 Exercise 2.4 bls 120

Give context-free grammar the generate the following languages. In all parts the alphabet $\sum$ is $\{0, 1\}$.

a) $\{w|w$ contains at least three 1s$\}$

RE = $(0 \cup 1)^* \circ 1 \circ (0 \cup 1)^* \circ 1 \circ (0 \cup 1)^* \circ 1 \circ (0 \cup 1)^*$

$S \Rightarrow A1A1A$
$A \Rightarrow AA|1|0$

d) $\{w|w$ the length of w is odd an its middle symbol is $0\}$

$S \Rightarrow ASA|0$
$A \Rightarrow 0|1$