Exercício 6

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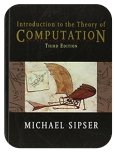

Introduction to the Theory of Computation

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Solução Certificado Solução fornecida há 2 anos

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Part a.

We just have to make sure that every occurrence of symbol b is coupled with an occurrence of symbol a. So, the grammar is given by:

$$S \to S\mathtt{ab} \mid S\mathtt{ba} \mid \mathtt{a}S\mathtt{b} \mid \mathtt{b}S\mathtt{a} \mid \mathtt{ab}S \mid \mathtt{ba}S \mid S\mathtt{a} \mid \mathtt{a}S \mid \mathtt{a}.$$

Part b.

The complement of language $\{\, \mathtt{a}^n\mathtt{b}^n \mid n \geq 0 \,\}$ is union of three languages: two of which are described with grammar from **part a**: one which has more as than bs and vice versa for other language. The third language is the set of strings with equal number of as and bs, but where at least one b occurs before some a.

So grammar is given by:

$$\begin{aligned}
S &\to S_1 \mid S_2 \mid S_3 \\
S_1 &\to S_1\mathtt{ab} \mid S_1\mathtt{ba} \mid \mathtt{a}S_1\mathtt{b} \mid \mathtt{b}S_1\mathtt{a} \mid \mathtt{ab}S_1 \mid \mathtt{ba}S_1 \mid S_1\mathtt{a} \mid \mathtt{a}S_1 \mid \mathtt{a} \\
S_2 &\to S_2\mathtt{ab} \mid S_2\mathtt{ba} \mid \mathtt{a}S_2\mathtt{b} \mid \mathtt{b}S_2\mathtt{a} \mid \mathtt{ab}S_2 \mid \mathtt{ba}S_2 \mid S_2\mathtt{b} \mid \mathtt{b}S_2 \mid \mathtt{b} \\
S_3 &\to T\mathtt{ab} \mid \mathtt{b}T\mathtt{a} \mid \mathtt{ba}T \\
T &\to T\mathtt{ab} \mid T\mathtt{ba} \mid \mathtt{a}T\mathtt{b} \mid \mathtt{b}T\mathtt{a} \mid \mathtt{ab}T \mid \mathtt{ba}T \mid \varepsilon.
\end{aligned}$$

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Part c.

We make sure that central symbol is # and that any symbol which appears on the left appears also on the right, in reverse order. Here is the grammar:

$$S \to 0ST0T \mid 1ST1T \mid \#$$
$$T \to TT \mid 0 \mid 1 \mid \varepsilon.$$

Part d.

We introduce the variables L, M and R which denote left, middle and right portion of string. Variable X denotes any string in $\{0, 1\}^*$, and T ensures the existence of i, j such that $x_i = x_j^{\mathcal{R}}$ (note that i and j are not necessarily distinct). The grammar is here:

$$S \to LTR$$
$$L \to \varepsilon \mid XM$$
$$R \to \varepsilon \mid MX$$
$$M \to \# \mid \#XMX\#$$
$$T \to 0T0 \mid 1T1 \mid 0M0 \mid 1M1 \mid \varepsilon$$
$$X \to \varepsilon \mid 0X \mid 1X.$$

Resultado 3 de 3

We write grammars.

‹ Exercício 5

Avaliar esta solução ☆ ☆ ☆ ☆ ☆

Exercício 7 ›