Exercício 3

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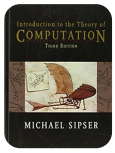

Introduction to the Theory of Computation

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Solução Certificado Solução fornecida há 2 anos

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Part a.

The variables are all capital letters you can count: $V = \{ R, X, S, T \}$.

Part b.

Terminals are small caps letters, i.e. $\Sigma = \{ a, b \}$ (yes, ε is not a terminal, it is an empty string).

Part c.

If not otherwise stated, start variable is the first one that appears, i.e. variable on the left side of first rule of grammar. So, start variable of grammar G is R.

Part d.

Try some derivations to obtain different strings in language $L(G)$ of grammar G. Three of them are `ab`, `ba`, `aab`.

Part e.

Strings ε, `a` and `b` are too short to belong to $L(G)$.

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Part f.

False, because there is no rule which translates T directly to `aba`.

Part g.

False, because there are three substitutions we can make starting from T: if we replace it with ε, we are stuck, if we replace it with X, it can only become strings `a` or `b`. Further, if we replace it with XTX, we again have three choices, which do not lead to `aba`.

Part h.

False, because there is no rule $T \Rightarrow T$.

Part i.

False, because if we replace T with XTX, it can not become T, since X becomes either `a` or `b`.

Part j.

True, because every X can be appropriately substituted with `a` or `b`.

Part k.

False, since X can only become `a` or `b`, and there is the end of that.

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Part l.

True, because $T \Rightarrow XTX \Rightarrow XX$, as T can be substituted with empty string ε.

Part m.

True again, analogously to before: $T \Rightarrow XTX \Rightarrow XXX$, since T can be substituted with X.

Part n.

False, because any string derived from S has at least one occurrence of $\mathtt{a}$ and $\mathtt{b}$.

Part o.

First we can fairly easily see that from T we can derive any string in $\{\mathtt{0},\mathtt{1}\}^*$. Further, from S we can get any string which begins with $\mathtt{a}$ and ends with $\mathtt{b}$ and vice versa. Since from R we can again get any number of X's on both sides, finally we can get any string which contains $\mathtt{a}$ and $\mathtt{b}$. That means that $L(G) = \{\mathtt{a},\mathtt{b}\}^* \setminus (\mathtt{a}^* \cup \mathtt{b}^*)$.

Resultado 4 de 4

We answer each part thoroughly.

‹ Exercício 2

Avaliar esta solução

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Exercício 4 ›