

Exercício 2

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Introduction to the Theory of Computation

ISBN: 9781133187790

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Passo 1

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Since we are asked to consider the equality problem, let's find inspiration in language EQ_{DFA} . Following this example, we define language

$$EQ_{DFA/REG} = \{ \langle B, R \rangle \mid B \text{ is a DFA, } R \text{ is a regular expression and } L(B) = L(R) \}$$

which represents the problem of determining whether a DFA and a regular expression are equivalent.

To prove that this problem is decidable, we need to construct a TM M which decides language $EQ_{DFA/REG}$. We borrow the ideas from **Theorem 4.3** and **Theorem 4.5**. The machine M works as follows:

$M =$ "On input $\langle B, R \rangle$, where B is a DFA and R is a regular expression:

1. Convert regular expression R to an equivalent NFA A (using procedure from **Theorem 1.54**).
2. Convert NFA A to equivalent DFA C (using procedure from **Theorem 1.39**).
3. Run TM from **Theorem 4.5** on input $\langle B, C \rangle$; if it accepts, *accept* and otherwise *reject*."

Resultado

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We find inspiration in language EQ_{DFA} .

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