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## Exercício 17

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### Passo 1

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It is trivial to prove that languages  $\{a\}$ , for  $a \in \Sigma$ ,  $\varepsilon$  and  $\emptyset$  are context-free: grammars are  $S \rightarrow a$ ,  $S \rightarrow \varepsilon$  and  $S \rightarrow S$  respectively.

Now previous *Exercise* shows that class of context-free languages is closed under all three regular operations, which is the only way to create regular expressions. Hence any regular expression can be captured using context-free grammar, which proves that any regular language is also a CFL.

### Resultado

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We need to prove that initial languages are context-free, which is trivial. Then previous *Exercise* does the job.

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