

# Theory of Computer Science

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## Exercise meeting 3

### Exercise 3.1

Consider the grammar  $G = \langle \Sigma, V, P, S \rangle$  with  $\Sigma = \{a, b\}$ ,  $V = \{S, A, B\}$  and the following rules in the set  $P$ :

$$\begin{aligned} S &\rightarrow ABB \\ S &\rightarrow \varepsilon \\ AB &\rightarrow AABBB \\ A &\rightarrow a \\ B &\rightarrow b \end{aligned}$$

Of what type(s) is  $G$  in the Chomsky hierarchy? What is  $\mathcal{L}(G)$ ? Describe the language as simply as possible.

### Exercise 3.2

Specify a *complete description* of a formal grammar  $G$  that generates the language  $L$  that consists exactly of the string representations of all numbers from  $\mathbb{N}_0$  in the decimal system. This means,  $L$  contains 0 and all non-empty words over  $\{0, 1, \dots, 9\}$  that do not start with 0.

A formal grammar is a 4-tuple  $G = \langle \Sigma, V, P, S \rangle$ , remember to define all components of this tuple. Of what type(s) is your grammar in the Chomsky hierarchy?