

Exercises for FLL, Fall 2018, sheet 1

Return Thursday Sep 13, in class

Note: you may work in teams of 2 if you wish. If you do, hand in a single solution sheet for both of you.

Exercise 1 (a) How many words exist over the alphabet $\Sigma = \{1\}$? and over the alphabet $\Sigma = \{a, b\}$? (b) How many words of length n exist over an alphabet of size k ? (c) How many languages exist over the alphabets from (a) and (b)? (d) How many languages of words of length n exist over an alphabet of size k ? (e, a bit more difficult, optional) Show that there are countably infinite many *finite* languages over $\Sigma = \{a, b\}$. *Hint: show two things. First, that there are **at least** as many finite languages as there are natural numbers – show this by giving an injective map from \mathbb{N} to the set of finite languages. Second, show that there are **at most** as many finite languages as there are natural numbers – show this by giving an injective map from the set of finite languages to \mathbb{N} . The second part is more difficult than the first.*