

## Exercises for FLL, Fall 2016, sheet 1 – Solutions

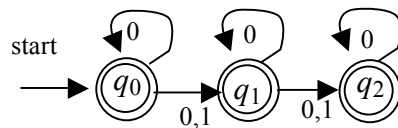
*Return Thursday Sep 15, in class*

*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 symbol set  $\Sigma = \{1\}$ ? and over the symbol set  $\Sigma = \{a, b\}$ ? (b) How many words of length  $n$  exist over a symbol set of size  $k$ ? (c) How many languages exist over the symbol sets from (a) and (b)? (d) How many languages of words of length  $n$  exist over a symbol set of size  $k$ ? (e) How many *finite* languages exist over  $\Sigma = \{a, b\}$ ?

**Exercise 2.** Design a DFA which accepts the language  $L = \{ w \in \{a, b\}^* \mid |w| > 0, \text{ and the last symbol in } w \text{ is equal to the first} \}$ . Describe your DFA both by a complete transition table and through a graphical transition diagram.

**Exercise 3.** Describe the language accepted by the NFA shown below in plain English.



**Exercise 4.** Construct a DFA equivalent to the NFA depicted above, *using the subset construction*. Present your DFA by a transition diagram.