

## Formal Languages and Automata Theory, SS 2018. Homework 8 (due Week 10)

0. Remaining exercises from Homework 7.

1. Prove that the following languages are not regular:

- (a)  $L = \{0^i | i \geq 1 \text{ is a perfect square}\}$ ;
- (b)  $L = \{w | w \text{ is binary string with equal number of } 0's \text{ and } 1's\}$ ;
- (c)  $L = \{w | w \text{ is binary string of the form } 0^m 1^n, m < n; m \geq 0, n \geq 0; m, n \text{ integer numbers}\}$ ;
- (d)  $L = \{0^{2^n} | n \geq 1\}$ ;
- (e)  $L = \{0^n | n \text{ is a prime numbers}\}$ ;
- (f)  $L = \{0^m 1^n 0^{m+n} | m \geq 1, n \geq 1\}$ .

2. Consider the DFA from Course 8 - slide 20 ([https://merascu.github.io/links/SS2018FLAT/Course8\\\_RegularLanguageProperties.pdf](https://merascu.github.io/links/SS2018FLAT/Course8\_RegularLanguageProperties.pdf)). Minimize it using the Table Filling Algorithm. Show all the steps of the algorithm.

3. Consider the following transition table for a DFA:

	0	1
$\rightarrow A$	$B$	$A$
$B$	$A$	$C$
$C$	$D$	$B$
$*D$	$D$	$A$
$E$	$D$	$F$
$F$	$G$	$E$
$G$	$F$	$G$
$H$	$G$	$D$

Construct the minimum-state equivalent DFA.