6.045J/18.400J: Automata, Computability and Complexity Prof. Nancy Lynch

Homework 3.1 (FAKE)

Due: NEVER *Elena Grigorescu*

This "fake homework" is intended simply as a study guide for the material covered in class 6, on Monday, February 26.

Reading: Section 4.1, p. 166-169,

Problem 1: **Algorithms for finite automata** (From Sipser Problem 4.11) Design:
(a) An algorithm that determines, for any DFA M with alphabet $\{0, 1\}$, whether or not M accepts any string containing an odd number of 1s.
(b) An algorithm that determines for any DFA M with alphabet $\{0, 1\}$, whether or not M accepts all strings containing an odd number of 1s.

Problem 2: **Algorithm for regular expressions** (From Sipser Problem 4.15) Design an algorithm that determines, for any regular expression R over alphabet $\{0, 1\}$, whether $L(R)$ includes some word w that has substring 111.

Problem 3: **Equivalent DFAs** (From Sipser Problem 4.16) Design an algorithm to determine whether two given DFAs are equivalent by testing the two DFAs on all strings up to a certain size. Calculate a size that works.