

# Homework 1

## COSE215, Spring 2016

Hakjoo Oh

**Due: 3/31, 09:00 (in class)**

**Problem 1** (10pts) Design a DFA (deterministic finite automata) that accepts the following language:

$$L = \{a^m b^n \mid m, n \geq 1\}$$

**Problem 2** (10pts) Design an NFA (nondeterministic finite automata) that accepts the language in Problem 1.

**Problem 3** (10pts) Design a DFA that accepts the following language:

$$L = \{w \in \{a, b\}^* \mid w \text{ does not end with } bb\}$$

**Problem 4** (10pts) Design an NFA that accepts the language in Problem 3.

**Problem 5** (10pts) Design an NFA that recognizes the following set of strings:

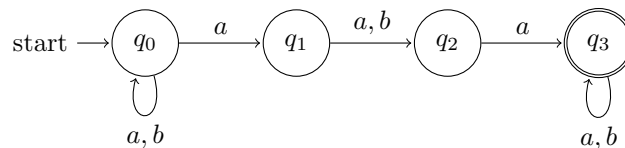
$$L = \{2016, 0331\}$$

where assume that  $\Sigma$  is the set of digits.

**Problem 6** (10pts) Design an  $\epsilon$ -NFA that accepts the following language:

$$L = \{a^m b^n c^o \mid m, n, o \geq 0\}$$

**Problem 7** (20pts) Convert the following NFA to a DFA:



**Problem 8** (20pts) Prove that a language  $L$  is accepted by some  $\epsilon$ -NFA if and only if  $L$  is accepted by some DFA. Use induction. Your proof should be clear, readable, and to the point; unreadable proofs will not be graded.