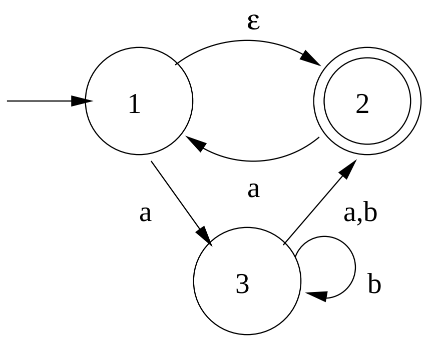
Homework 1

Due: Friday, Feb. 19, at 9:00pm in the handin bin located on 2^{nd} floor CIT

Collaboration is allowed only by terms of the policy. All problems are worth 20 points. TA hours: Jason Friday 3-4PM, Tom Thursday 8-9PM in the TA annex room on the second floor of the CIT.

Problem 1.

Convert the following nondeterministic finite automata to an equivalent deterministic finite automata.



Problem 2.

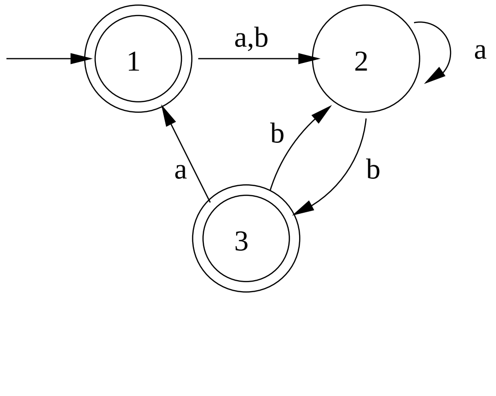
Convert the following regular expressions to nondeterministic finite automata.

a. $(0 \cup 1)^*000(0 \cup 1)^*$

b. $(((00)^*(11)) \cup 01)^*$

Problem 3.

Convert the following finite automata to a regular expression.



Problem 4.

Let $B_n = \{a^k |$ where k is a multiple of $n\}$. Show that for each $n \geq 1$, the language B_n is regular.

Problem 5.

Suppose that L is a context-free language and R is a regular language. Is $L - R$ context-free? Prove your answer.

HINT: First prove that the intersection of a context-free language and a regular language is context free.