COSC 440
Exam 1 Review
Fall 2012

Assume that $\Sigma = \{0, 1\}$ unless otherwise noted.

1. Give the RE, NFA, and DFA for the language $A = \{w|w$ contains an even number of 0s, or contains exactly two 1s$\}$. The NFA can have at most six states.

2. Is the language over $\Sigma = \{a, b, c\}$ containing at least one a and at least one b regular? Prove it.

3. Prove that the language $D = \{a^n b^n c^i | n <= i <= 2n\}$ is not regular.

4. Provide the DFA for the language that is the set of all strings of 0s and 1s whose number of 0s is divisible by 4 and the number of 1s is even. Convert that DFA to an RE using the GNFA method.

5. Convert this NFA to a DFA:
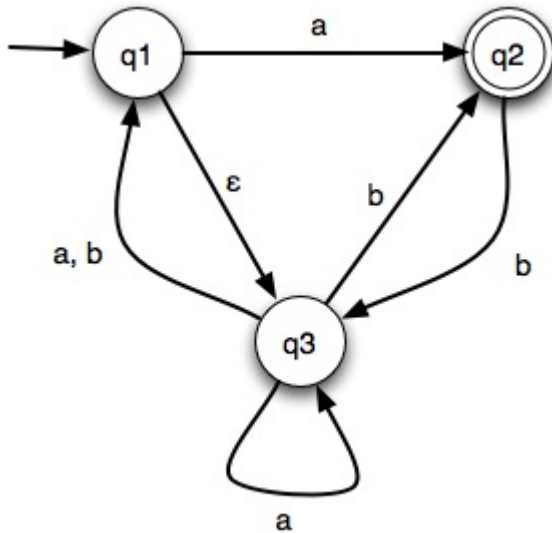
6. Show that the class of regular languages is closed under union, concatenation, and Kleene star.

7. For languages A and B, let the shuffle of A and B be the language

$\{w|w = a_1 b_1 \cdots a_k b_k$, where $a_1 \cdots a_k \in A$ and $b_1 \cdots b_k \in B$, each $a_i, b_i \in \Sigma^*\}$.

Show that the class of regular languages is closed under shuffle.