Practice Quiz 01

**General Course Goals**

1. Why do we need a formal model of computation to meet the goals of this class?

**Using Formal Definitions**

2. Provide the formal definition for (union, concatenation, star). Include the symbol for the operation.

3. Give a formal description of the finite automaton given below. You may assume that all symbols in the alphabet are shown on the diagram. *(See Exercise 1.2)*

4. Draw a state transition diagram which represents the formally-described finite automaton described below. *(See Exercise 1.3)*

**Computation**

5. For each of the following strings, state if the finite automaton given below would *accept* or *reject* the string. *(See Exercise 1.1)*

6. Construct a finite automaton that recognizes the language given below. *(See Exercise 1.5, 1.6)*

**Proving Language Properties**

7. Prove the following language is regular.

8. For any string $w = w_1w_2 \cdots w_n$, the *reverse* of $w$, written $w^R$, is the string $w$ in reverse order (i.e. $w^R = w_n \cdots w_2w_1$). For any language $A$, let $A^R = \{w^R | w \in A\}$. Show that if $A$ is regular, so is $A^R$. *(See Problem 1.31)*

9. Let $B_n = \{a^k | k$ is a multiple of $n\}$. Show that for each $n \geq 1$, the language $B_n$ is regular. *(See Problem 1.36)*