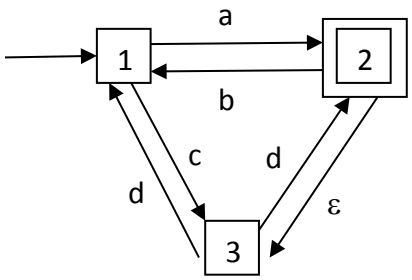
CS 475/575 Quiz 1 **Fall 2013** **Name _____**

1. Given this non-deterministic finite-state machine:



   a. Write all the accepted strings that have length 4. **[12 points]**

   b. Draw an equivalent deterministic finite-state machine. **[15 points]**

2. Let L denote the set of all strings over alphabet {a, b, c} such that the number of a's is divisible by 3, or the number of b's is divisible by 3, or the number of c's is divisible by 3. Draw a non-deterministic finite-state machine with fewest states that accepts L. **[15 points]**

3. Again let L denote the set of all strings over alphabet {a, b, c} such that the number of a's is divisible by 3, or the number of b's is divisible by 3, or the number of c's is divisible by 3.

    a. Consider a deterministic finite-state machine with fewest states that accepts L. It is not necessary for you to draw this deterministic machine. How many states are needed? Specify a unique label for each state, and explain what each state represents. Which are the start state and final states? Also specify which transitions should exist. **[16 points]**

    b. Write an accepting computation sequence for string abcbab using this DFSM. **[12 points]**

4. Draw deterministic finite-state machines that accept each of these languages.

    a. The set of all strings over alphabet {a, b} that do not contain substring aaa and also do not contain substring bbb. **[15 points]**

    b. The set of all strings over alphabet {a, b} that contain exactly one occurrence of the substring aa and also exactly one occurrence of the substring bb. **[15 points]**