CS3311 Homework 10 Due date: Friday, November 12, 2010, in class

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The answers, comments, and programs (if any) must be the original work of the author. While discussion with others is permitted and encouraged, the final work should be done individually. You are not allowed to work in groups. You are allowed to build on the material supplied in the class. If you use any other source than the class notes and the textbook, specify it clearly.

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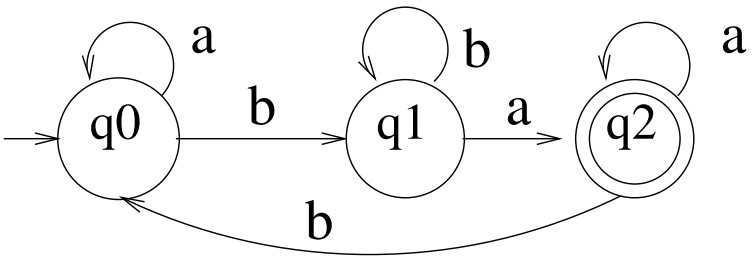
1. *(10 points)* Give a formal description (in the form of a 5-tuple) of the DFA shown below.



2. *(80 points)* Build a DFA that accepts the described language. Explain how you construct the machine.

Part a. The set of strings over $\{a, b, c\}$ in which all the a's precede the b's, which in turn precede the c's. It is possible to have no a's, b's, or c's.

Part b. The empty set (over $\{a, b\}$).

Part c. The empty string (over $\{a, b\}$).

Part d. The set of strings over $\{a, b\}$ that do not begin with the substring aaa.

Part e. The set of strings over $\{a, b, c\}$ that begin with a, contain exactly two 'b's, and end with cc.

Part f. The set of strings over $\{a, b, c\}$ in which every b is immediately followed by at least one c.

Part g. $(ab)^*ba$

Part h. $\{w \mid w \in \{a, b\}^*$ and the length of w is at least 5 $\}$.

3. *(10 points)* Use Theorem 5.5.3 and Example 6.1.1 to convert the regular expression $(ab)^*ba$ into an NFA-λ. Apply the full steps and do not simplify the machine. Do not construct the machine directly.