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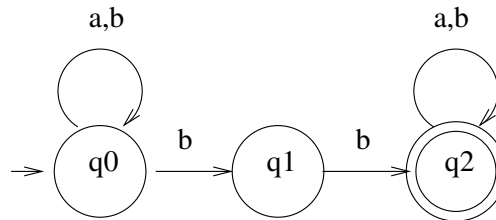
The answers must be the original work of the author. While discussion with others is permitted and encouraged, the final work should be done individually. You are not allowed to work in groups. You are allowed to build on the material supplied in the class. Any other source must be specified clearly.

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1. (40 points) Use Theorem 5.5.3 and Example 6.1.1 to convert the regular expression  $(a \cup b)^*bb(a \cup b)^*$  into an NFA- $\lambda$ .

Apply the full steps for converting a regular expression to an NFA- $\lambda$ . Do not simplify the machine by removing  $\lambda$  transitions or making other changes. Do not construct the machine “directly”. For your convenience, it is acceptable to label machines corresponding to segments of the regular expression and use them in subsequent drawings (see class examples for this).

2. (60 points) Let  $M_1$  be the following NFA:



- (a) Give the transition function  $t$  for  $M_1$  in tabular form.
- (b) Use algorithm 5.6.3 to construct a state diagram of a DFA that is equivalent to  $M_1$ . Give the transition function and draw the state diagram of the equivalent DFA.