CS3311 Homework 6

Due: Wednesday, February 22, 2017, by class time, 12:05pm
Submission: Typed, pdf on Canvas
(scanned submissions are not allowed)

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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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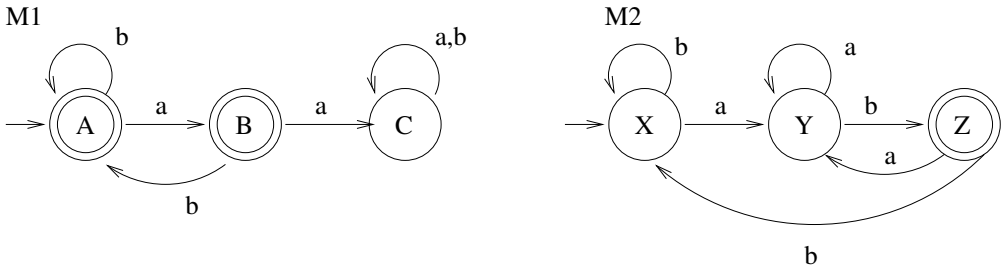
**1.** *(30 points)* Use the procedure described in class to construct the machine $M3$ that corresponds to the "product" of machines $M1$ and $M2$. In other words, $L(M3) = L(M1) \cap L(M2)$.

$M1$ accepts the strings that do not contain '$aa$'.
$M2$ accepts the strings that end with '$ab$'.

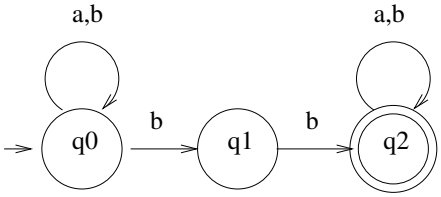
Test all three machines with the four strings $aa, ab, aba, aab$ and state whether they are accepted.




**2.** *(30 points)* Use Theorem 5.5.3 and Example 6.1.1 to convert the following regular expression 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).

$$(a \cup b)^* \, bb \, a^* \, b^*$$

**3.** *(15+25 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.