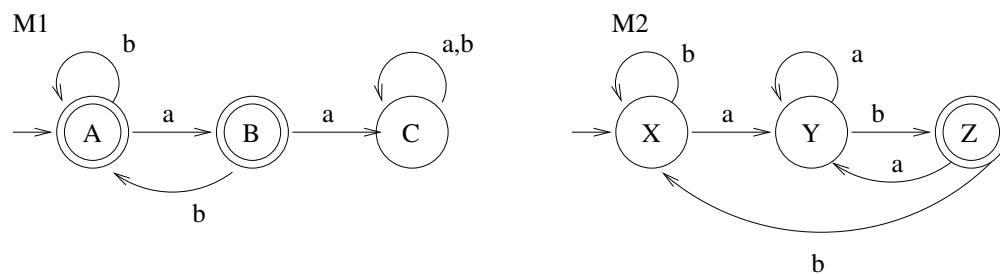


The answers must be the original work of the author. While discussion with others is permitted and encouraged, the final work should be done individually. You are not allowed to work in groups. You are allowed to build on the material supplied in the class. Any other source must be specified clearly.

1. (40+20 points) Let M_1 and M_2 be the following machines where,

M_1 accepts the strings that do not contain 'aa', and

M_2 accepts the strings that end with 'ab'.



(a) Use the procedure described in class to construct the machine M_3 that corresponds to the “product” of machines M_1 and M_2 . In other words, $L(M_3) = L(M_1) \cap L(M_2)$.

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

2. (40 points) Use Theorem 5.5.3 and Example 6.1.1 to convert the following regular expression into an NFA- λ . Apply the full steps for converting a regular expression to an NFA- λ . Do not simplify the machine by removing λ 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).

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