Technische Universität München **Winter term 2015/16**
I7
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Automata and Formal Languages — Sample Solution 11

Due 08.01.2016

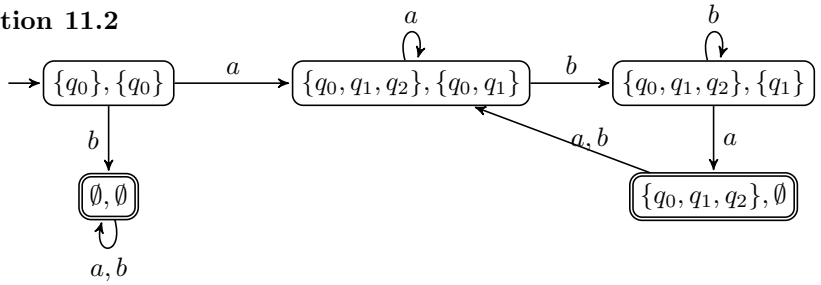
Solution 11.1

(a) $(b^*(aa)^*)^\omega$

(b) $(b^*(\varepsilon + aaa^*))^\omega$

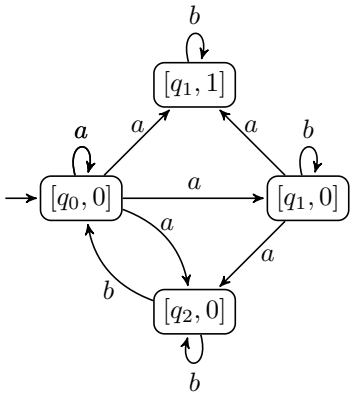
Solution 11.2

(a)

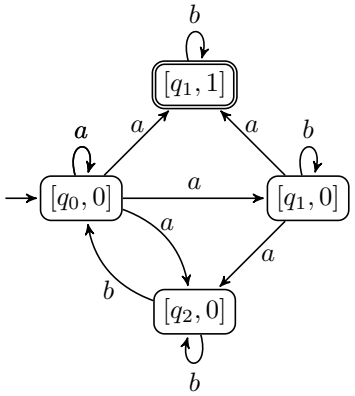


(b) From NMA A_1 with $F_1 = \{q_1\}$, construct an NGA A_1' and then an NBA A_1''. In this case the NGA is an NBA.

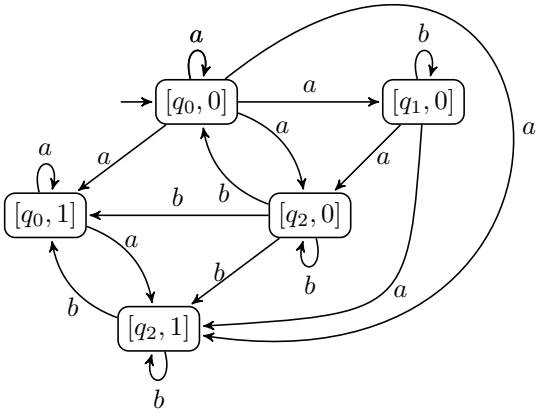
NGA A_1' with $\mathcal{F} = \{\{[q_1, 1]\}\}$:



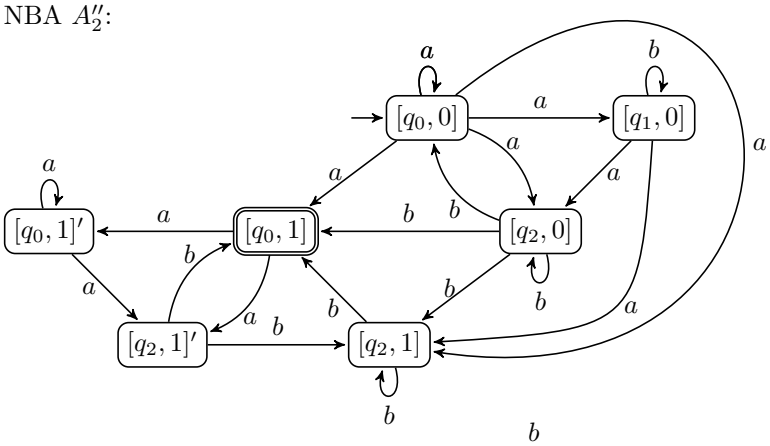
NBA A_1'':



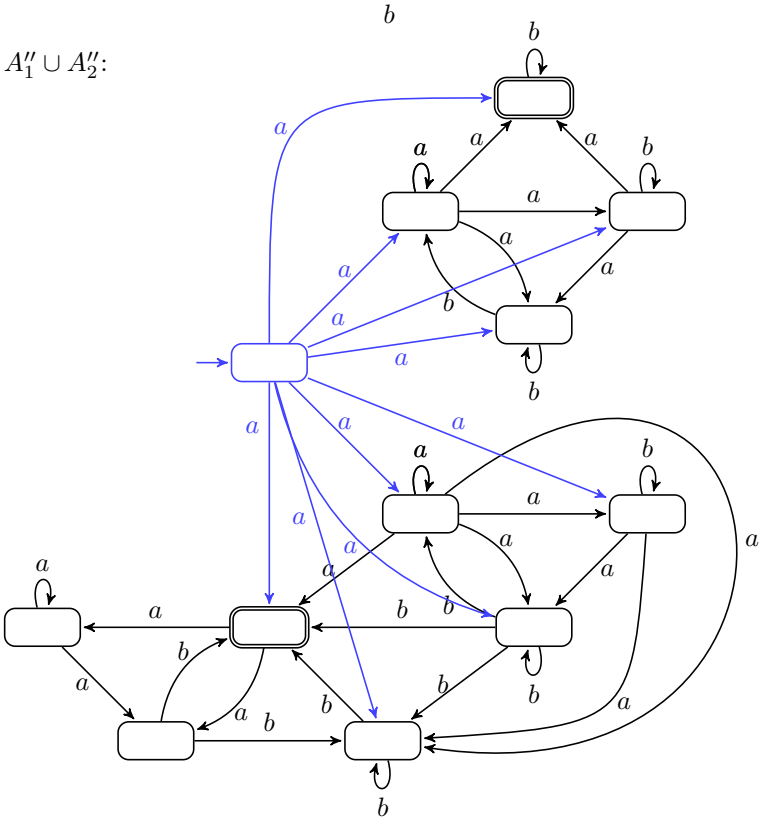
From NMA A_2 with $F_2 = \{q_0, q_2\}$, construct an NGA A_2' and then an NBA A_2''.
NGA A_2' with $\mathcal{F} = \{\{[q_0, 1], [q_2, 1]\}\}$:



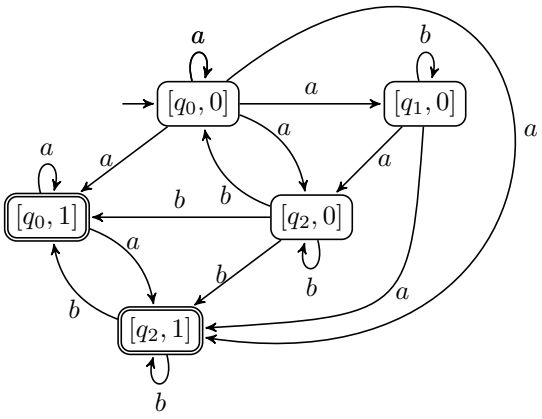
NBA A_2'':



$A_1'' \cup A_2''$:



(c)



Solution 11.3

$A' = (Q', \Sigma, \delta', (q_0, 0), (Q \setminus F) \times \{1\})$, where $Q' = (Q \times \{0\}) \cup ((Q \setminus F) \times \{1\})$ and

$$\begin{aligned} \delta'((q,0),a) &= (\delta(q,a) \times \{0,1\}) \cap Q' \\ \delta'((q,1),a) &= (\delta(q,a) \times \{1\}) \cap Q' \ . \end{aligned}$$