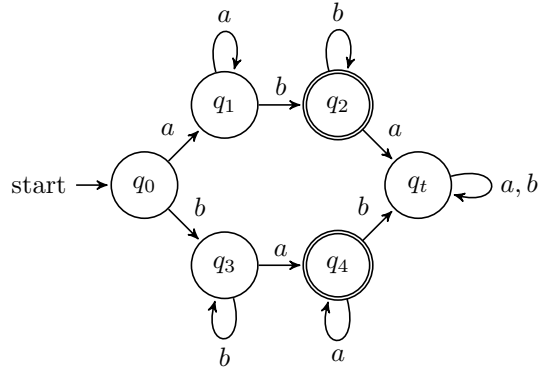# Exercise 27

a

$\mathfrak{A}$: The automaton $\mathfrak{A}$ does both, Büchi- and co-Büchi-recognize L.

b

Assume $\mathfrak{A}'$ E-recognizes L. So for $\rho(i) = q_f$ and $q_f \in F$ for $i \in \mathbb{N}$. So the read letter before the accepting state is reached are final. Let the read word be $w = a^{1+n_1}b^{n_2}$. So $\mathfrak{A}'$ would recognize w but $w \notin L$. Contradiction $\mathfrak{A}'$ does not recognize L.

Assume $\mathfrak{A}''$ A-recognizes L. Let $w = a^u b^\omega$. So $\rho(i) = q_f$ where $q_f \in F$ and $i \leq u$. By repeating the letter a the automaton must allways reach a final state. So $w = a^\omega$ leads to a final state. This means $\mathfrak{A}''$ recognizes $w = a^\omega \notin L$. Contradiction $\mathfrak{A}''$ does not recognize L.
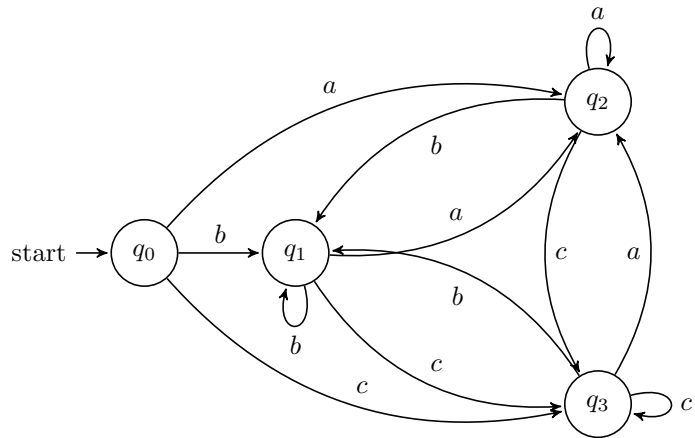
c

$\mathfrak{A}_A$:
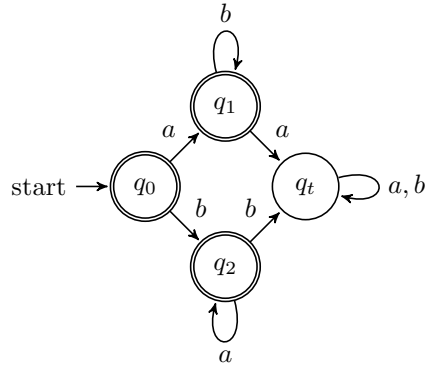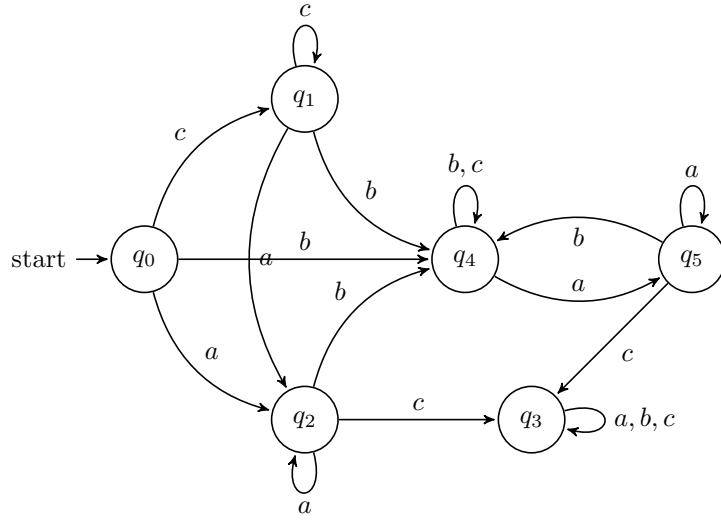

Exercise 28

a

$\mathfrak{A}_{SW}$:

$\mathcal{F} = \{\{q_0\}, \{q_0, q_2\}, \{q_0, q_3\}, \{q_0, q_1, q_3\}, \{q_0, q_2, q_3\}, \{q_0, q_1, q_2, q_3\}\}$

b

$\mathfrak{A}'_{SW}:$

$\mathcal{F} = \{$
$\{q_0\},$
$\{q_0, q_1\}, \{q_0, q_2\}, \{q_0, q_4\},$
$\{q_0, q_1, q_2\}, \{q_0, q_1, q_4\}, \{q_0, q_2, q_4\}, \{q_0, q_4, q_5\},$
$\{q_0, q_1, q_2, q_4\}, \{q_0, q_1, q_4, q_5\}, \{q_0, q_2, q_4, q_5\},$
$\{q_0, q_1, q_2, q_4, q_5\}$
$\}$