Arda YAKAKAYI - 19253519

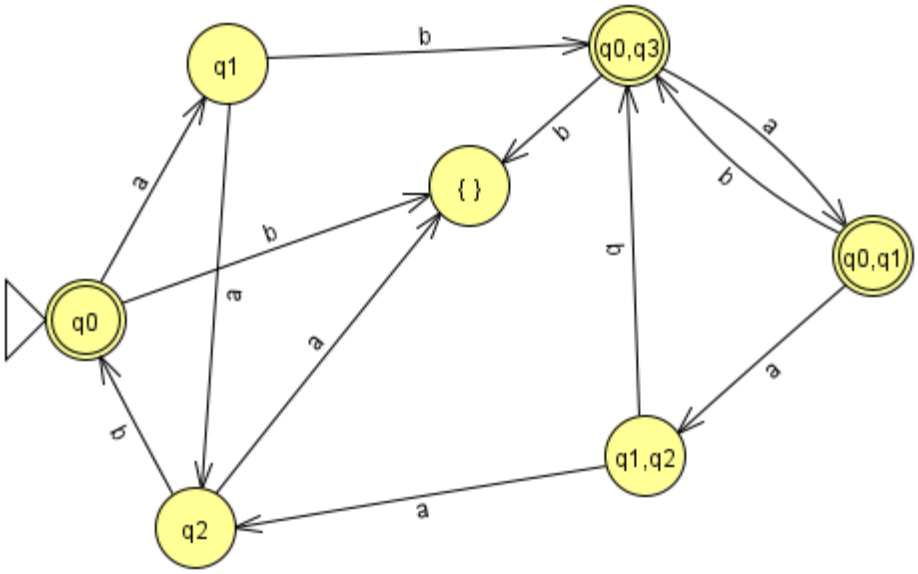
FORMAL LANGUAGES & AUTOMATA

Page 74 and 84 ;

2.2.6. (a) Find a simple nondeterministic finite automaton accepting $(ab \cup aab \cup aba)^*$.

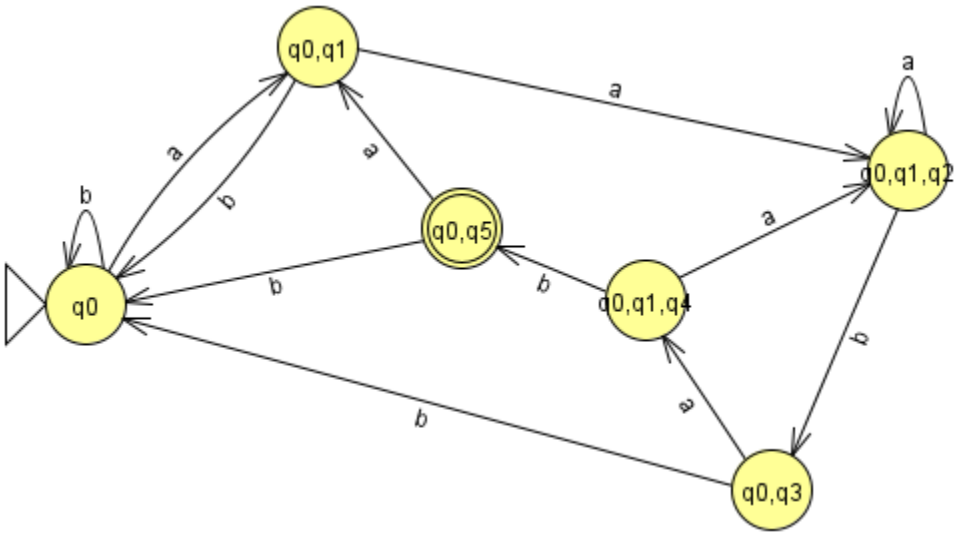
(b) Convert the nondeterministic finite automaton of Part (a) to a deterministic finite automaton by the method in Section 2.2.

(c) Try to understand how the machine constructed in Part (b) operates. Can you find an equivalent deterministic machine with fewer states?



q	*a*	*b*
q_0	q_1	{ }
q_1	q_2	q_0q_3
q_2	{ }	q_0
q_0q_3	q_1q_0	{ }
q_1q_0	q_1q_2	q_0q_3
q_1q_2	q_2	q_0q_3

2.2.7. Repeat Problem 2.2.6 for the language $(a \cup b)^*aabab$.

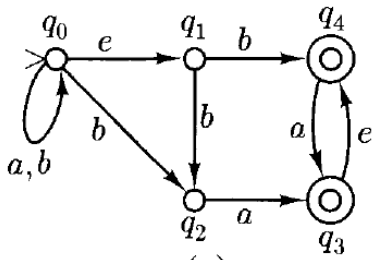


q	*a*	*b*
Q_1	q_0q_1	q_0
q_0q_1	$q_0q_1q_2$	q_0
$q_0q_1q_2$	$q_0q_1q_2$	q_0q_3
q_0q_3	$q_0q_1q_4$	q_0
$q_0q_1q_4$	$q_0q_1q_2$	q_0q_5
q_0q_5	q_0q_1	q_0

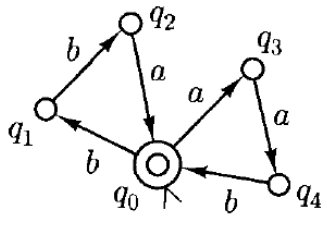
2.2.8. Repeat Problem 2.2.6 for the language $(a \cup b)^* a(a \cup b)(a \cup b)(a \cup b)(a \cup b)$.

q	*a*	*b*
q_0	q_0q_1	q_0
q_0q_1	$q_0q_1q_2$	q_0q_2
q_0q_2	$q_0q_1q_2q_3$	q_0q_3
q_0q_3	$q_0q_1q_4$	q_0q_4
q_0q_4	$q_0q_1q_5$	q_0q_5
q_0q_5	q_0q_1	q_0
$q_0q_1q_2$	$q_0q_1q_2q_3$	$q_0q_2q_3$
$q_0q_1q_3$	$q_0q_1q_2q_4$	$q_0q_2q_4$
$q_0q_1q_4$	$q_0q_1q_2q_5$	$q_0q_2q_5$
$q_0q_1q_5$	$q_0q_1q_2$	q_0q_2
$q_0q_2q_3$	$q_0q_1q_3q_4$	$q_0q_3q_4$
$q_0q_2q_4$	$q_0q_1q_3q_5$	$q_0q_3q_5$
$q_0q_2q_5$	$q_0q_1q_3$	q_0q_3
$q_0q_3q_4$	$q_0q_1q_4q_5$	$q_0q_4q_5$
$q_0q_3q_5$	$q_0q_1q_4$	q_0q_4
$q_0q_4q_5$	$q_0q_1q_5$	q_0q_5
$q_0q_1q_2q_3q$	$_0q_1q_2q_3q_4$	$q_0q_2q_3q_4$
$q_0q_1q_2q_4$	$q_0q_1q_2q_3q_5$	$q_0q_2q_3q_5$
$q_0q_1q_2q_5$	$q_0q_1q_2q_3$	$q_0q_2q_3$
$q_0q_1q_3q_5$	$q_0q_1q_2q_4$	$q_0q_2q_4$
$q_0q_1q_4q_5$	$q_0q_1q_2q_5$	$q_0q_2q_5$
$q_0q_2q_3q_4$	$q_0q_1q_3q_4q_5$	$q_0q_3q_4q_5$
$q_0q_2q_3q_5$	$q_0q_1q_3q_4$	$q_0q_3q_4$
$q_0q_2q_4q_5$	$q_0q_1q_3q_5$	$q_0q_3q_5$
$q_0q_3q_4q_5$	$q_0q_1q_4q_5$	$q_0q_4q_5$
$q_0q_1q_2q_3q_4$	$q_0q_1q_2q_3q_4q_5$	$q_0q_2q_3q_4q_5$
$q_0q_1q_2q_3q_5$	$q_0q_1q_2q_3q_4$	$q_0q_2q_3q_4$
$q_0q_1q_2q_4q_5$	$q_0q_1q_2q_3q_5$	$q_0q_2q_3q_5$
$q_0q_1q_3q_4q_5$	$q_0q_1q_2q_4q_5$	$q_0q_2q_4q_5$
$q_0q_2q_3q_4q_5$	$q_0q_1q_3q_4q_5$	$q_0q_3q_4q_5$
$q_0q_1q_2q_3q_4q_5$	$q_0q_1q_2q_3q_4q_5$	$q_0q_2q_3q_4q_5$

2.2.9. Construct deterministic finite automata equivalent to the nondeterministic automata shown below.

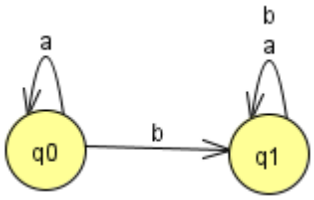


(a)

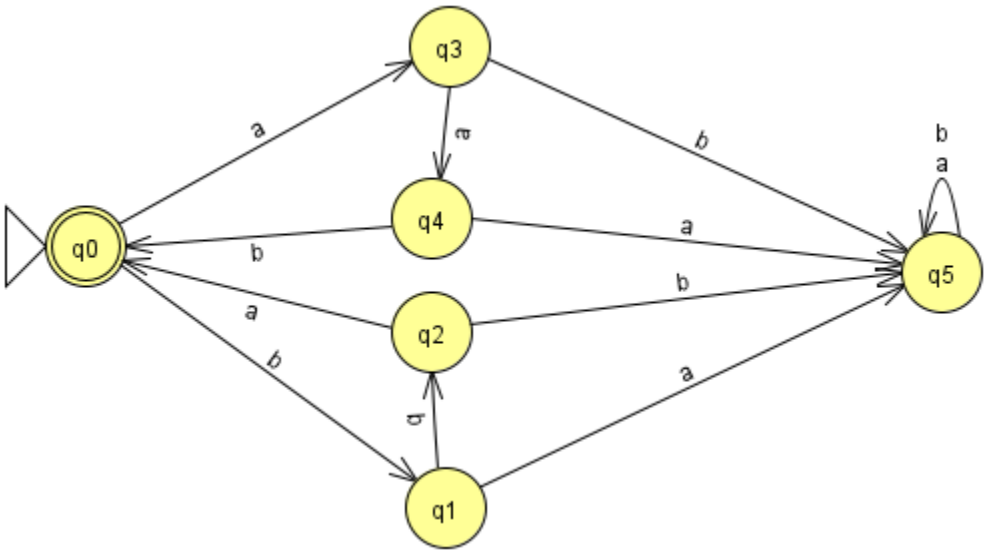


(b)

a)



b)



2.3.4. Using the construction in the proofs of Theorem 2.3.1, construct finite automata accepting these languages.

(a) $a^*(ab \cup ba \cup e)b^*$

(b) $((a \cup b)^*(e \cup c)^*)^*$

(c) $((ab)^* \cup (bc)^*)ab$

a)