Intro to Computer Science Theory: Homework 5

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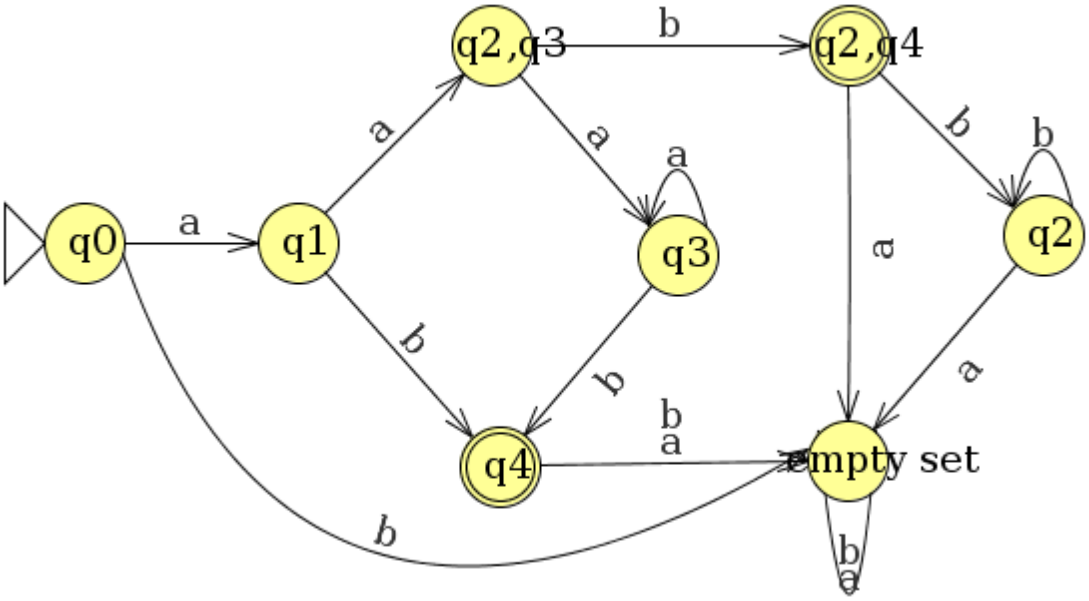
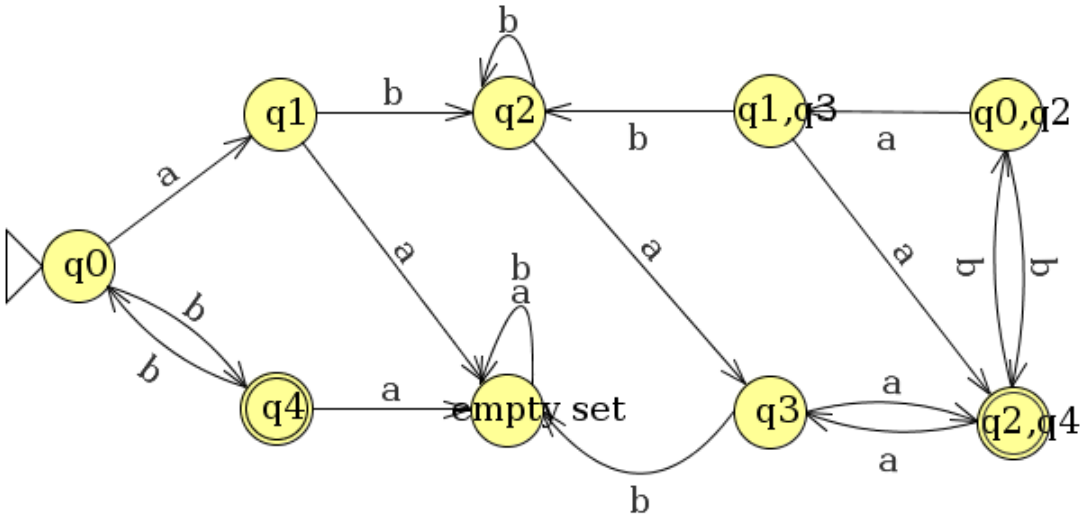
Problem 1

Use the so-called *subset construction* given in Theorem 1.39 to draw state transition diagrams for (D)FAs for each of the NFAs below. Name the states of the FA so that for each it is clear which subset of NFA states it represents. You need only show the states that are reachable from the initial state.

(a)



(b)



Problem 2

Choose one of the following NFAs from above and:

(a) give a formal definition of the NFA. You may rename the states if that makes your definition clearer or more elegant, but if so you must either redraw the machine or indicate how the old names map to the new names.

$$M = \{Q, \Sigma, \delta, q_0, F\}$$
$$Q = \{q_0, q_1, q_2, q_3, q_4\}$$
$$\Sigma = \{a, b\}$$

$\delta(q, x) : Q \times \Sigma \to 2^Q =$

	a	b
q_0	$\{q_1\}$	$\emptyset$
q_1	$\{q_2, q_3\}$	$\{q_4\}$
q_2	$\emptyset$	$\{q_2\}$
q_3	$\{q_3\}$	$\{q_4\}$
q_4	$\emptyset$	$\emptyset$

$$q_0 = q_0$$
$$F = \{q_4\}$$

(b) give a formal definition for the FA equivalent to the NFA you did not choose. You may rename the states if that makes your definition clearer or more elegant,

but if so you must either redraw the machine or indicate how the old names map to the new names. Your definition must stand in its own way and may not refer to the NFA on which it is based.

$$M = \{Q, \Sigma, \delta, q_0, F\}$$

$$Q = \{q_0, q_1, q_2, q_3, q_4, q_1q_3, q_0q_2, q_2q_4, \emptyset\}$$

$$\Sigma = \{a, b\}$$

$\delta(q, x) : Q \times \Sigma \to Q =$

	a	b
q_0	q_1	q_4
q_1	$\emptyset$	q_2
q_2	q_3	q_2
q_3	q_2q_4	$\emptyset$
q_4	$\emptyset$	q_0
q_1q_3	q_2q_4	q_2
q_0q_2	q_1q_3	q_2q_4
q_2q_4	q_3	q_0q_2

$$q_0 = q_0$$

$$F = \{q_4, q_2q_4\}$$

If you have any questions, comments, or concerns, please contact me at alvin@omgimanerd.tech