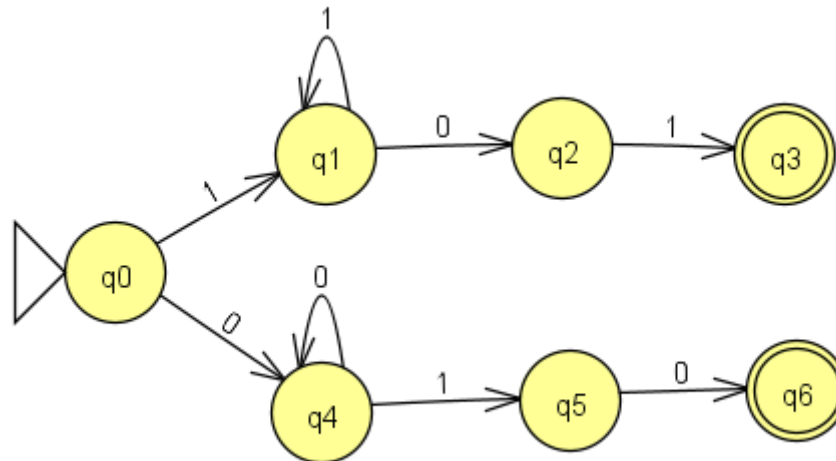
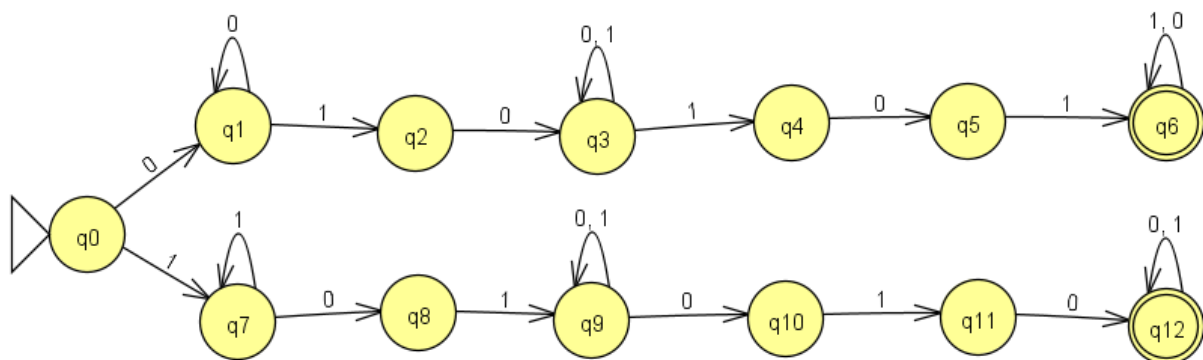

CS 361– Homework 3
Total possible points: 60

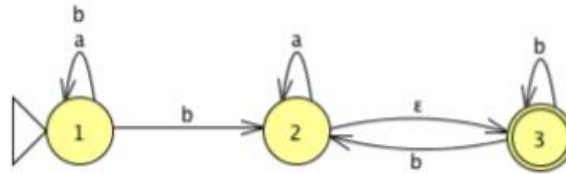
1. (15 points) Design an **NFA** that recognizes the language $L_1 = \{x \text{ over } \{0, 1\} \mid x \text{ contains substring } 010 \text{ or } x \text{ contains substring } 101\}$.



2. (15 points) Construct an **NFA with no more than 20 states** that recognizes language $L_2 = \{x \text{ over } \{0, 1\} \mid x \text{ contains both substring } 010 \text{ and substring } 101\}$.

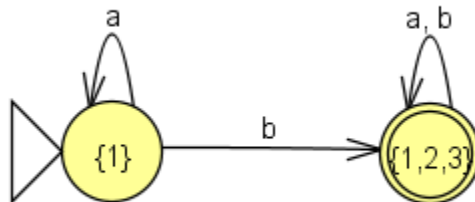


3. (10 points) Use **Theorem 1.39**, which we discussed in class, to **convert** the following **NFA M** into an equivalent **deterministic FA M'**.

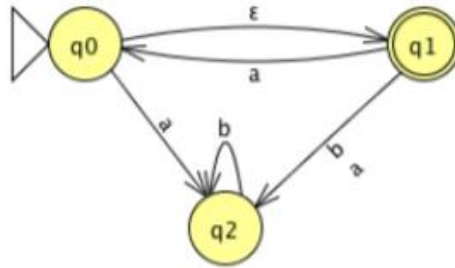


NFA	States	a	b
	1 - S	{1}	{1, 2, 3}
	2	{2, 3}	{2, 3}
	3 - F	{}	{2, 3}
$E(1) = \{1\}$			
DFA	States	a	b
	{1} - S	{1}	{1, 2, 3}
	{1, 2, 3} - F	{1, 2, 3}	{1, 2, 3}

DFA:

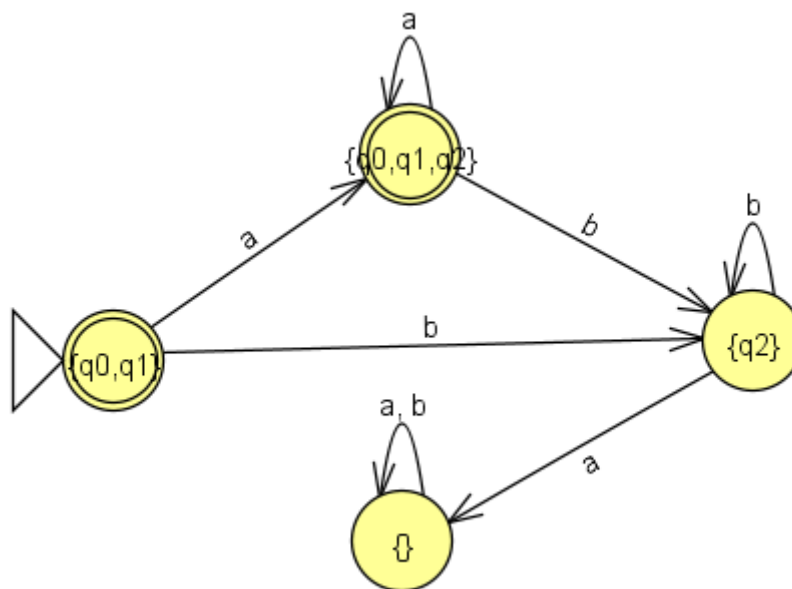


4. (10 points) Use **Theorem 1.39**, which we discussed in class, to **convert** the following **NFA M** into an equivalent **deterministic FA M'** .



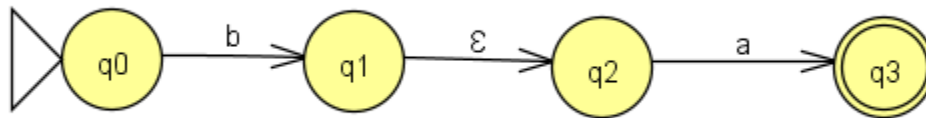
NFA	States	a	b
	q0 - S	{q0, q2}	{q2}
	q1 - F	{q0, q1, q2}	{q2}
	q2	{}	{q2}
$E(q0) = \{q0, q1\}$			
DFA	States	a	b
	{q0, q1} - S, F	{q0, q1, q2}	{q2}
	{q2}	{}	{q2}
	{q0, q1, q2} - F	{q0, q1, q2}	{q2}
	{}	{}	{}

DFA:

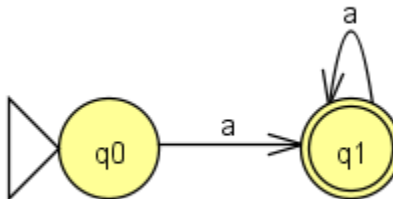


5. (10 points) Construct an **nondeterministic FA** that accepts the language described by the following regular expression: $(baUa^+)^*b$ (For full credit show all your *intermediate steps*).

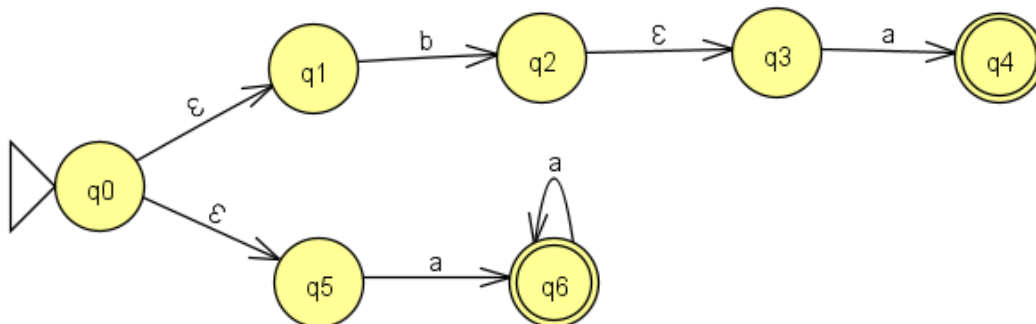
ba :



a^+ :



$ba \cup a^+$:



$(ba \cup a^+)^*$:

