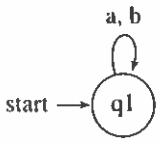
CMSC 303 Introduction to Theory of Computation
Deterministic Finite Automata Exercise

Key

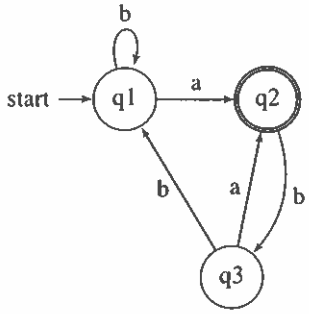
1. When given $\Sigma = \{a, b\}$, which of the following are DFA's? Explain why or why not.

(a)



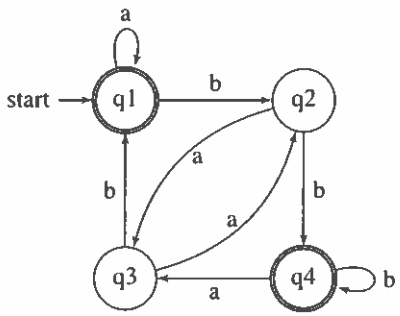
Yes. Have transitions for both alphabet symbols from every state.

(b)



No. State 2 does not have a transition for the symbol a.

2. Give the formal description of the DFA below:



$Q = \{q_1, q_2, q_3, q_4\}$

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

$q_0 = q_1$

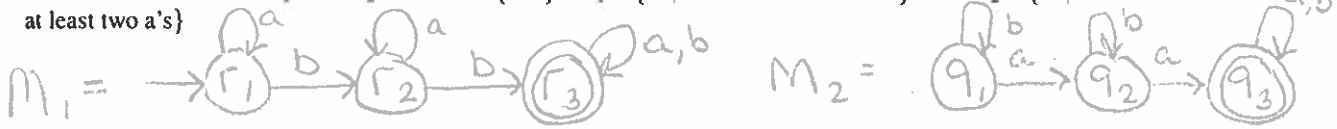
$F = \{q_1, q_4\}$

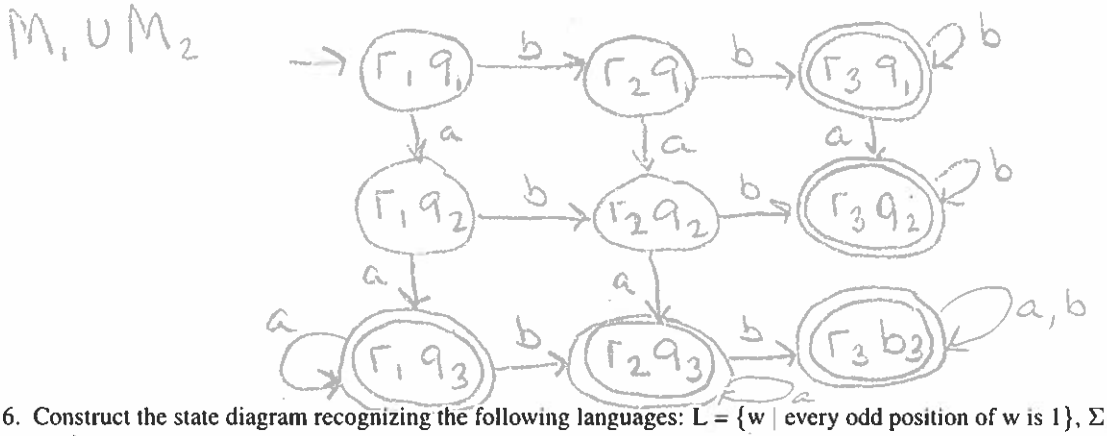
δ	a	b
q_1	q_1	q_2
q_2	q_3	q_4
q_3	q_2	q_1
q_4	q_3	q_4

3. Construct the state diagram recognizing the following languages: L = {w | w contains the substring 01}, Σ = { 0, 1}

4. Construct the state diagram recognizing the following languages: L = {w | length of w is at most 5 symbols}, Σ = { 0, 1}

5. Construct the union of M_1 and M_2 where Σ = {a, b}. M_1 = {w | w has at least two b's}, and M_2 = {w | w has at least two a's}





6. Construct the state diagram recognizing the following languages: L = {w | every odd position of w is 1}, Σ = { 0, 1}