Department of Computer Science and Engineering
Premier University

CSE 309: Theory of Computation

Title: CT 02

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Remarks

Q: (i) Design an NFA for the following grammer, $L_2 = \{w \mid w$ contains at least three 1's$\}$

=> Let, $\Sigma = \{0, 1\}$

We need strings with at least three 1's.

States:

q_0 (Start) q_1, q_2, q_3 (final)

Meaning.

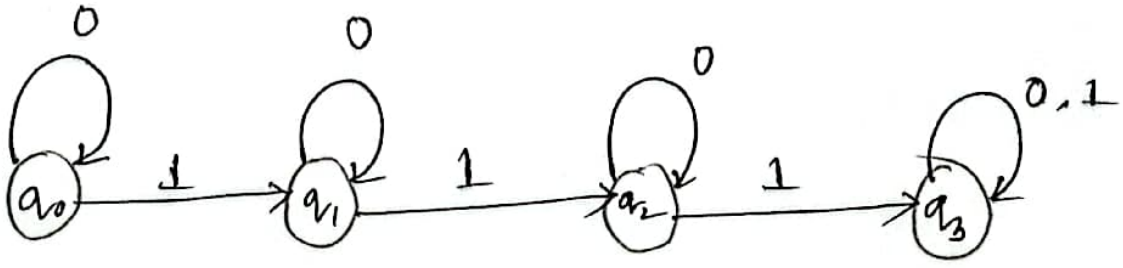
(i) $q_0 \rightarrow$ Seen 0 ones

(ii) $q_1 \rightarrow$ Seen 1 one

(iii) $q_2 \rightarrow$ Seen 2 ones

(iv) $q_3 \rightarrow$ Seen ≥ 3 ones

Transitions:



This NFA accepts any string with three or more 1's.

(ii) Now Convert the NFA of L2 to equivalent DFA. (Provide explanation for all necessary steps).

=> Since the NFA is already deterministic (each state has one defined transition for every input symbol), the equivalent DFA has the same state and transitions:

Current	Input 0	Input 1	Final
q_0	q_0	q_1	No
q_1	q_1	q_2	No
q_2	q_2	q_3	No
q_3	q_3	q_3	Yes

$\therefore$ DFA = $(\{q_0, q_1, q_2, q_3\}, \Sigma = \{0, 1\}, \delta, q_0, F = \{q_3\}$