BRAC UNIVERSITY
CSE331 : Automata and Computability
Summer 2025

Duration: 35 minutes **Quiz 1** **Total: 20 marks**

Name: **ID:** 0.5 Points

Section: 0.5 Points

DFA & RE

$L_1 \rightarrow \{w \in \Sigma^* \mid w \text{ contains 1 in the second position}\}$, where $\Sigma = \{0, 1\}$

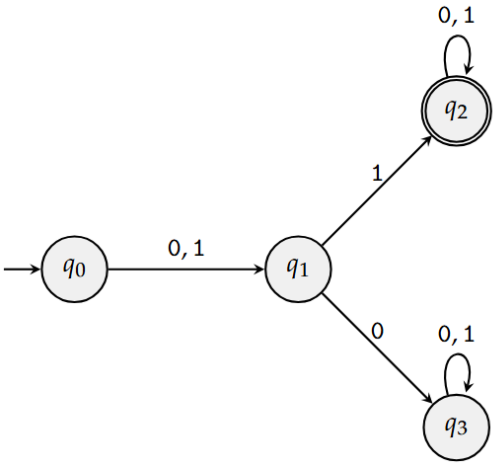
$L_2 \rightarrow \{w \in \Sigma^* \mid |w| \% 3 = 1\}$, where $\Sigma = \{0, 1\}$

$L_3 \rightarrow \{w \in \Sigma^* \mid \text{Every even position of w is 1}\}$, where $\Sigma = \{0, 1\}$

$L_4 = L_1 \cap L_2$

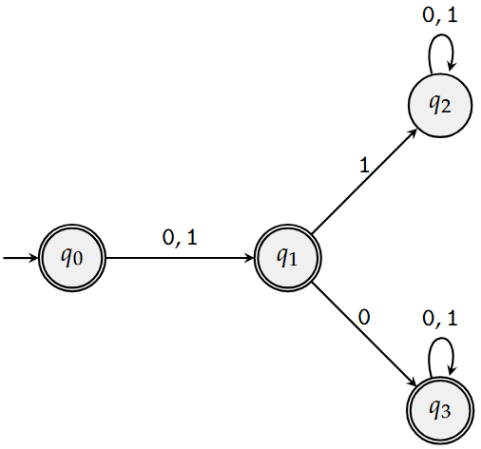
A. Draw the state diagram of a DFA for L_1. (5 Points)

Answer:



B. Draw the state diagram of a DFA for $\overline{L_1}$. (2 Points)

Answer:



C. Write a Regular Expression for L_2. (5 Points)
Answer: (ΣΣΣ)*Σ

D. Write a Regular Expression for L_2*. (1 Point)
Answer: ((ΣΣΣ)*Σ)*

E. Write all four letter strings in L_4. (2 Points)
Answer: 0100, 0101, 0110, 0111, 1100, 0101, 1110, 1111.

F. Write a Regular Expression for L_4. (3 Points)
Answer: Σ1Σ(ΣΣΣ)*Σ

G. Is $L_3 \subset L_1$? (1 Point)
Answer: No.

Bonus

$L_1 \rightarrow \{w \in \Sigma^* \mid w \text{ contains 1 in the second position}\}$, where $\Sigma = \{0, 1\}$

$L_2 \rightarrow \{w \in \Sigma^* \mid |w| = 3\}$, where $\Sigma = \{0, 1\}$

Write a Regular Expression for the following regular language: (2 Points)

$L(M) \rightarrow \overline{L_1 \cap L_2}$

Answer: