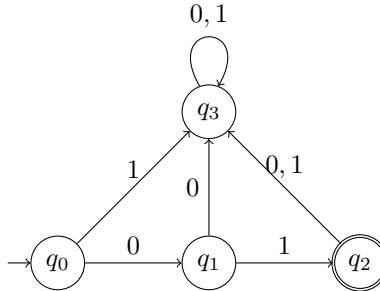

QUIZ 3: DFA DEFINITIONS AND PROOFS

1. Consider the automaton $M = (Q, \Sigma, \delta, q_0, F)$ where:



- $Q = \{q_0, q_1, q_2, q_3\}$,
- $\Sigma = \{0, 1\}$,
- $\delta(q_0, 0) = q_1$, $\delta(q_0, 1) = q_3$, $\delta(q_1, 1) = q_2$, $\delta(q_1, 0) = q_3$, $\delta(q_2, 0) = \delta(q_2, 1) = \delta(q_3, 0) = \delta(q_3, 1) = q_3$.
- $F = \{q_2\}$

- (A) $\delta(q_0, 10) = \underline{\hspace{2cm}}$
 (B) $\hat{\delta}(q_1, 101) = \underline{\hspace{2cm}}$
 (C) The language of M , $L(M) = \underline{\hspace{2cm}}$

2. We will write down an alternate definition of $\hat{\delta}(q, w)$, by induction on the length of w :

- (A) $\hat{\delta}(q, \epsilon) = \underline{\hspace{2cm}}$
 (B) Let $w = ax$, where $a \in \Sigma$ and $x \in \Sigma^*$. Then
 $\hat{\delta}(q, ax) = \underline{\hspace{2cm}}$ You need to write an expression for the above where $\hat{\delta}$ is only applied on words of length less than that of w .