

Part C: Designing DFAs [10 Points]

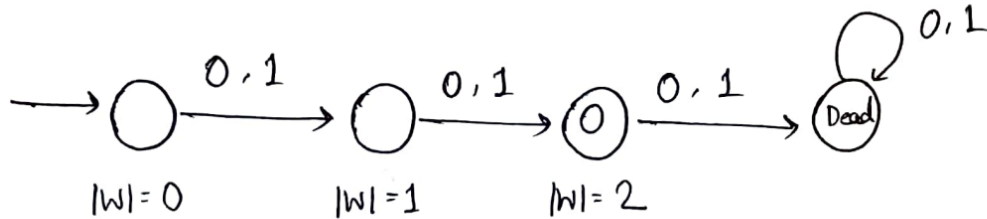
Let $\Sigma = \{0, 1\}$. Consider the following languages over Σ .

$L_1 = \{w : \text{the length of } w \text{ is two}\}$

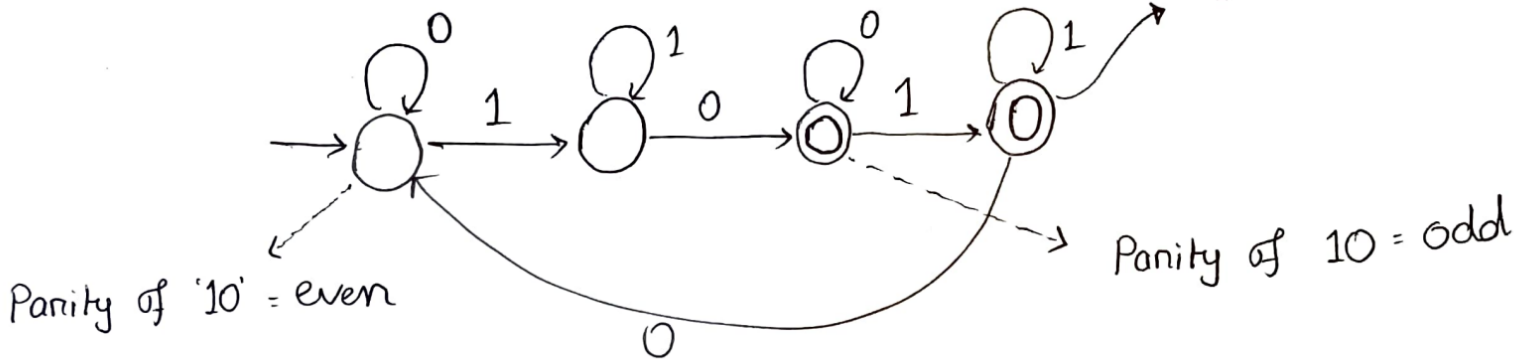
means exactly two

$L_2 = \{w : \text{the number of times } 10 \text{ appears in } w \text{ is odd}\}$

- (a) Give the state diagram for a DFA that recognizes L_1 . (2 points)



- (b) Give the state diagram for a DFA that recognizes L_2 . (4 points)



- (c) If we were to construct a DFA for the language $L_1 \cap L_2$ using the construction shown in class, how many states would it have? (1 point) $4 \times 4 = 16$

- (d) How many strings are in $L_1 \cap L_2$? (1 point) 1 (string 10)

- (e) Give a 4-state DFA for the language $L_1 \cap L_2$. (2 points)

