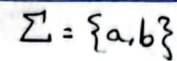


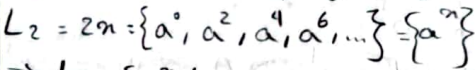
سؤال ۱ الف)



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

$$\Rightarrow h = \{x \in \sum_{*}^n \mid x[1] = x[n]\}$$

$L_1 = 7n = \{a^7, a^{14}, a^{21}, \dots\} = \{a^{7n}\}$ (سؤال 2 الف)



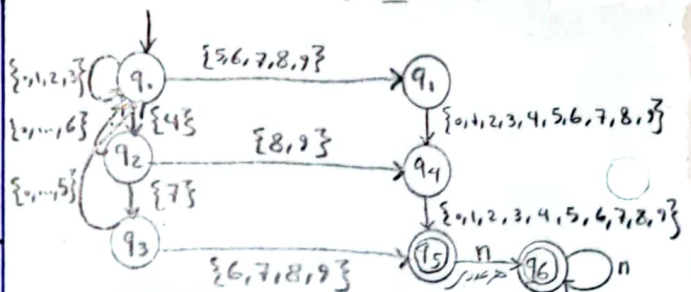
$$\Rightarrow L = \{a^x \mid x \bmod 7 = 0 \text{ or } x \bmod 2 = 0\}$$

$1 \times 2 = 14$
 $14n$
 $14n+1$
 $14n+2$
 $14n+3$
 $14n+4$
 $14n+5$
 $14n+6$
 $14n+7$
 $14n+8$
 $14n+9$
 $14n+10$
 $14n+11$
 $14n+12$
 $14n+13$

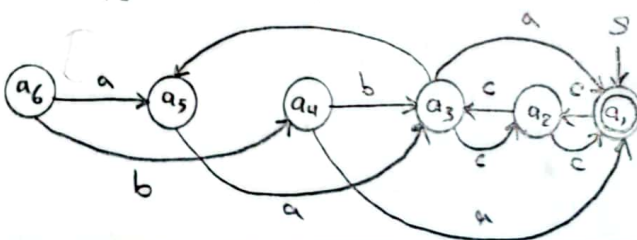
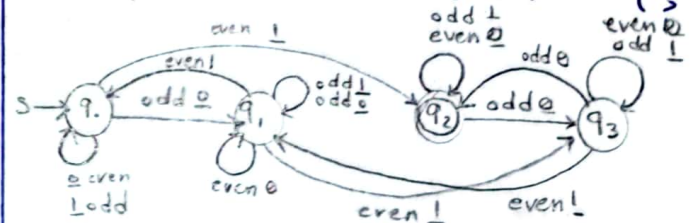
Hand-drawn state transition diagram for a Turing machine. States are $q_0, q_1, q_2, q_3, q_4, q_5$. Transitions are labeled with input/output symbols. q_0 is the start state, and q_5 is the final state. The diagram shows a sequence of states q_0 to q_4 with various transitions, and a self-loop on q_5 labeled "1000".



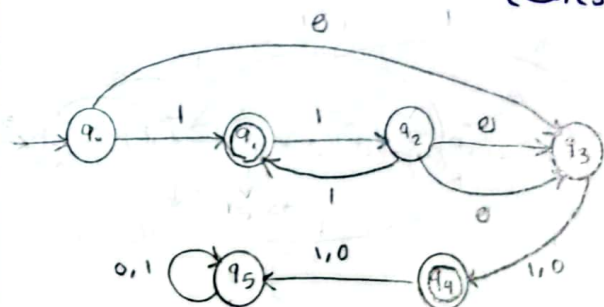
(2) برای اعداد ۳ رقمی



سؤال (5)


$$q_0: (E, E) \quad q_1: (0, E) \quad q_2: (E, 0) \quad q_3: (0, 0)$$


سؤال 3 (الف)



سوال 6) ی دایم زبان های منظم با عملیات ها بر مثل اجتماع ، اشتراک ، متمم یکدیگر و ... همواره منظم می باشد :

$$v \in \Sigma^* \Rightarrow \frac{L}{v} = \{w \mid vw \in L\}$$

also $\frac{L}{a} = \{w \mid aw \in L\} \Rightarrow \text{chopLeft}(L) = \bigcup_{a \in \Sigma} \frac{L}{a}$

$$x \equiv_L y \Leftrightarrow \forall z \in \Sigma^*, xz \in L \Leftrightarrow yz \in L \Leftarrow$$

$\text{chopdef}(L) \leq \text{مقطع است}$.