

Formal Languages and Automata: DFA Practice Problems

A. Give state diagrams of DFAs recognizing the following languages. In all cases, the alphabet is $\{0, 1\}$.

- a. $\{w \mid w \text{ begins with a } 1 \text{ and ends with a } 0\}$
- b. $\{w \mid w \text{ contains at least five } 1\text{'s}\}$
- c. $\{w \mid \text{the length of } w \text{ is at most } 5\}$
- d. $\{w \mid w \text{ is in } \{0, 1\}^* \text{ and } w \text{ does not have two consecutive } 1\text{'s}\}$

B. DFA to accept the decimal strings divisible by 3.

Example strings: 393, 915, 7254 are accepted

Example strings: 593, 785, 9346 are rejected

C. All the strings on $\Sigma = \{a, b\}$ with exactly one a .

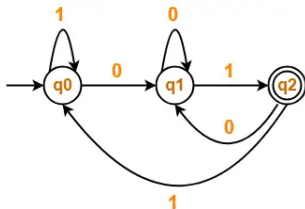
D. All the strings on $\Sigma = \{a, b\}$ with atleast one a .

Practice Problems..

- E.** $\Sigma = \{a, b\}$ and let $L = \{baa\}$. Design a DFA for L .
- F.** Design a DFA that accepts all strings over the alphabet $\{a, b\}$ that are of length 3 or more and end with ab .
- G.** Design a DFA that accepts all strings over the alphabet $\{a, b\}$ that contain the substring abb .
- H.** Design a DFA that accepts all strings over the alphabet $\{a, b\}$ where the number of a 's is divisible by 3 and the number of b 's is divisible by 2.

Practice Problems..

I. Find the strings and language accepted by the given DFA.



J. Let $\Sigma = \{a, b\}$ and let $L = \{w \in \Sigma^* \mid w \neq \epsilon \text{ and the first and last character of } w \text{ are same}\}$. Design a DFA for L.