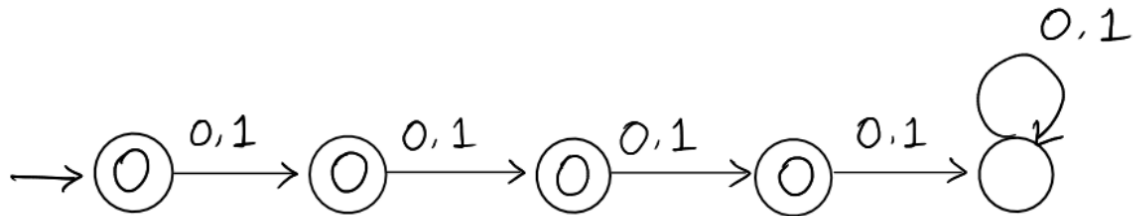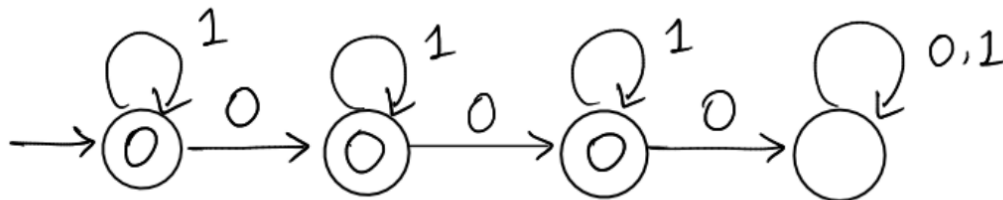**Part A Solution**

1. *Let* $\Sigma = \{0, 1\}$. *Consider the following language over the* Σ.
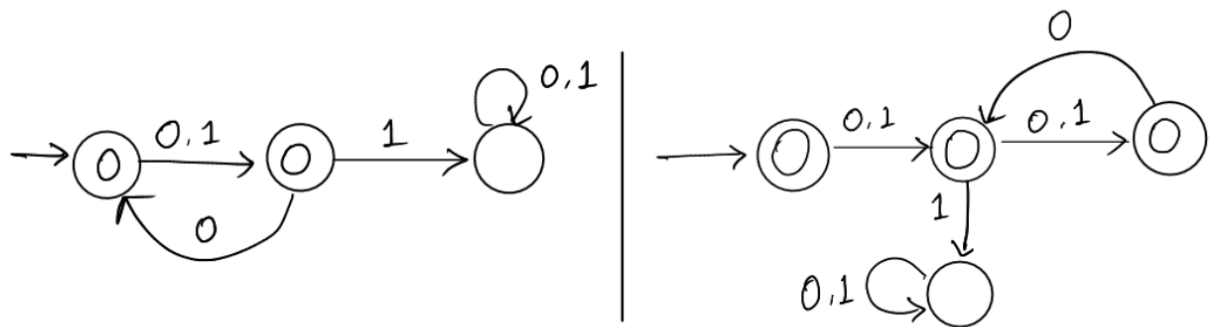
a) $L1 = \{length\ of\ w\ is\ at\ most\ three\}$
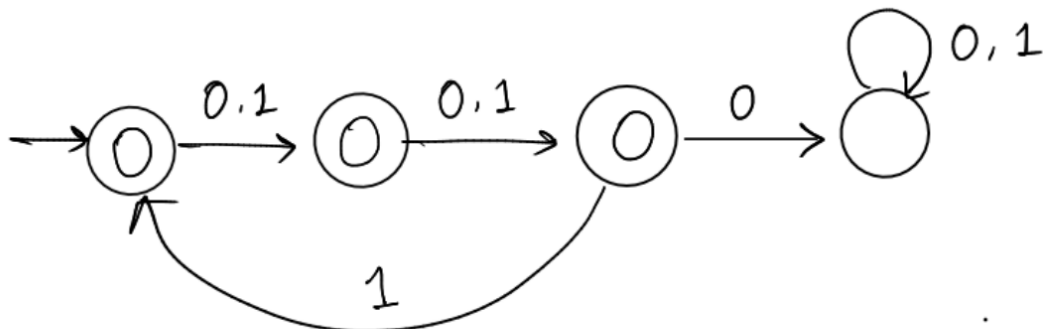

b) $L2 = \{w\ contains\ at\ most\ two\ 0s\}$

c) $L3 = \{every\ second\ letter\ of\ w\ is\ 0\}$

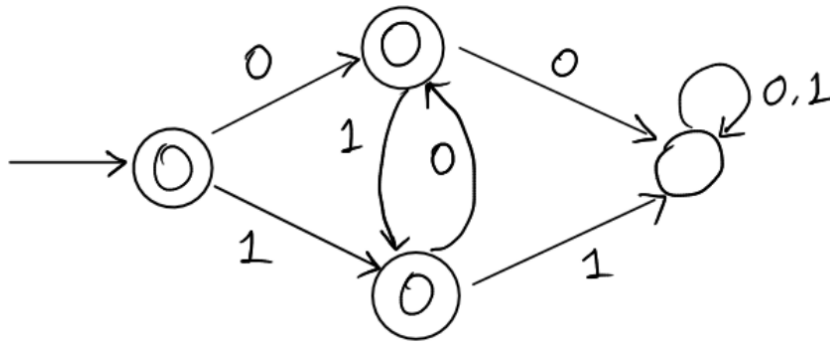d) $L4 = \{every\ third\ letter\ of\ w\ is\ 1\}$

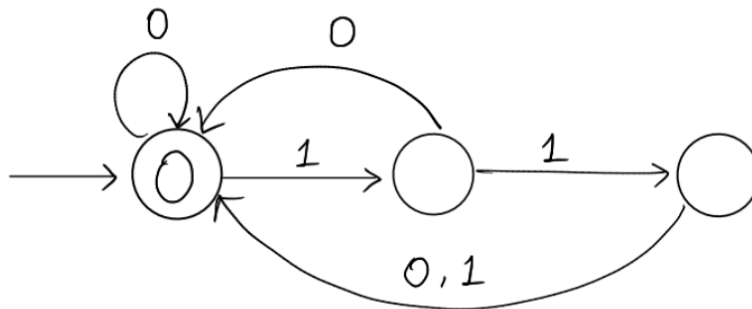e) $L5 = \{0s \text{ and } 1s \text{ alternate in } w\}$
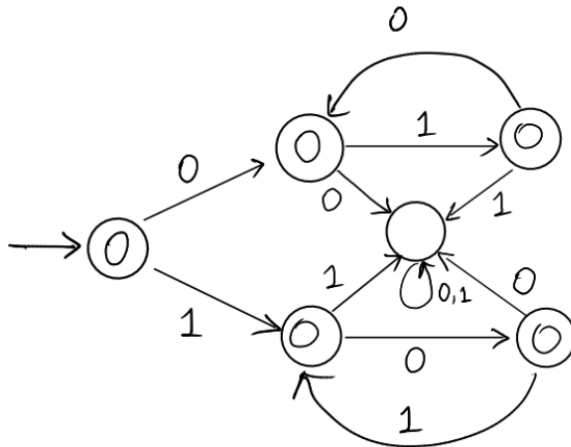
f) $L6 = \{w \text{ contains neither } 00 \text{ nor } 11\}$ **[Same as e) L5]**
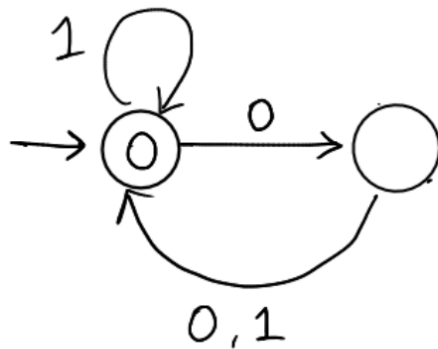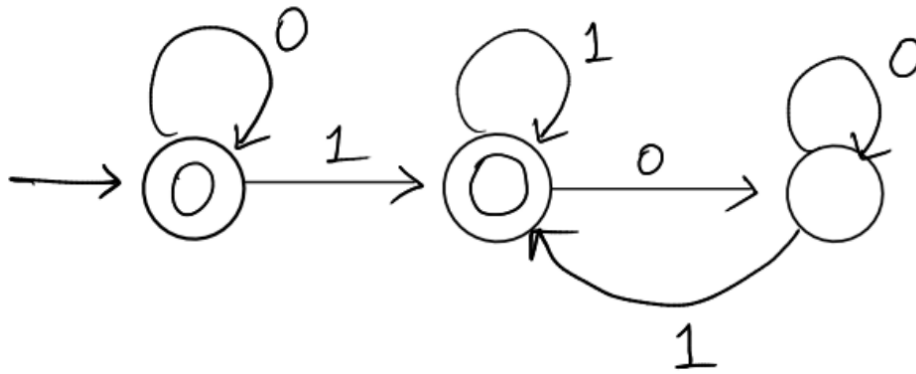**Another solution:**

g) $L7 = \{w \text{ ends with } 1^m, \text{ where } m \text{ is multiple of three}\}$
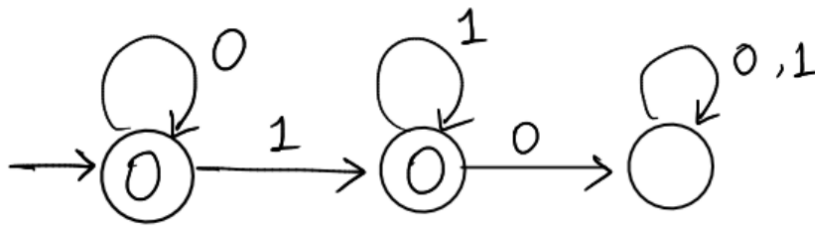

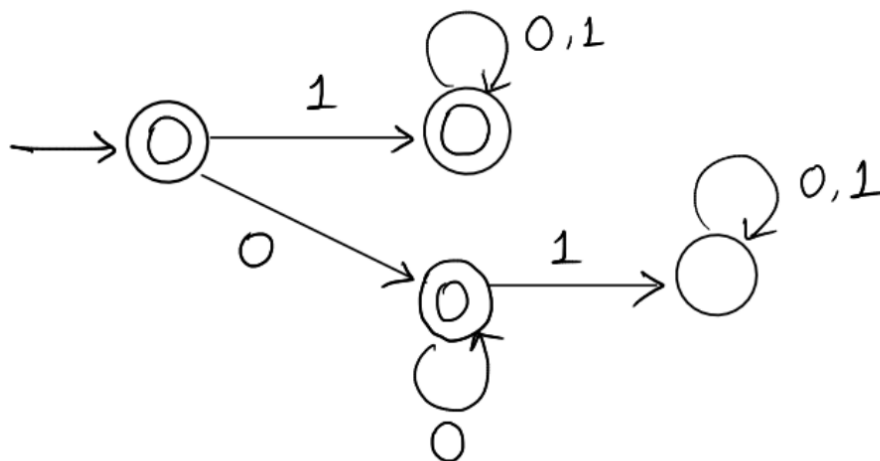h) $L8 = \{w \text{ ends with even numbers of } 0s\}$
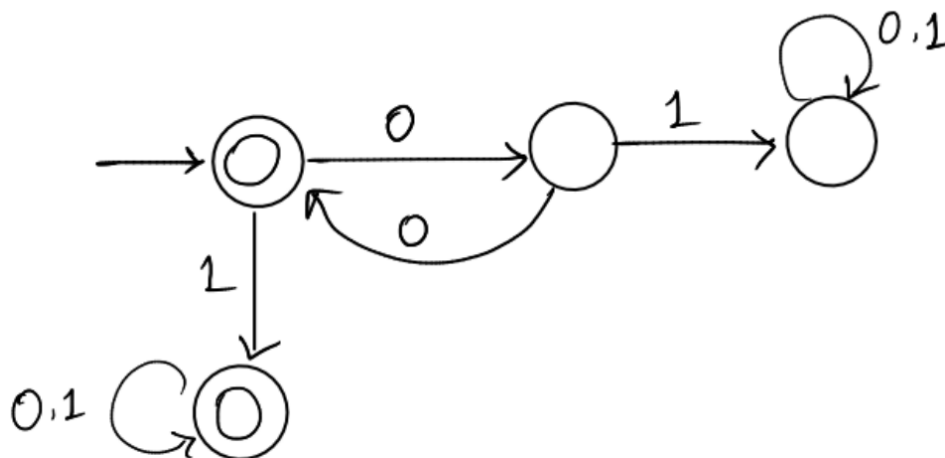
i) $L9 = \{no\ 0\ appears\ after\ the\ last\ 1\ in\ w\}$

j) $L10 = \{no\ 0\ appears\ after\ the\ first\ 1\ in\ w\}$

k) $L10 = \{no\ 0\ appears\ before\ the\ first\ 1\ in\ w\}$

l) $L11 = \{w\ starts\ with\ even\ numbers\ of\ 0s\}$

m) $L12 = \{ w \text{ starts with } 1^m, \text{ where } m \text{ is multiple of three} \}$