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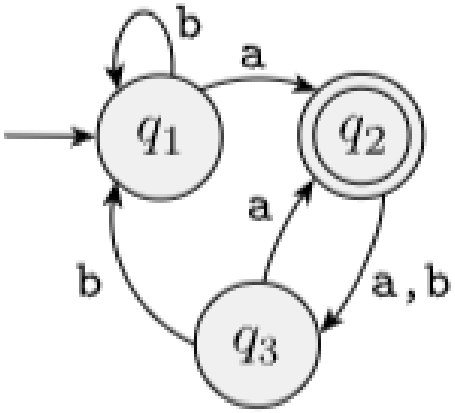
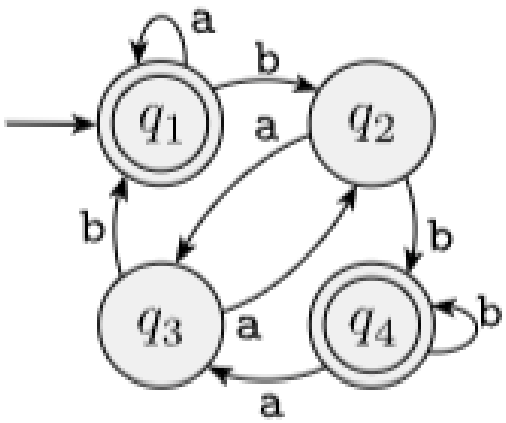
Question 1.1

Given DFAs M_1 and M_2:



M_1



M_2

Part a

What are the start states?

- q_1 for M_1
- q_1 for M_2

Part b

What are the set of accept states?

- $\{q_2\}$ for M_1
- $\{q_1, q_4\}$ for M_2

Part c

What are the state sequences for the input `aabb`?

- $q_1 \to q_2 \to q_3 \to q_1 \to q_1$ for M_1
- $q_1 \to q_1 \to q_1 \to q_2 \to q_4$ for M_2

Part d

Do the DFA accept the string `aabb`?

- M_1 does NOT accept
- M_2 accepts

Part e

Do the DFA accept the string ε?

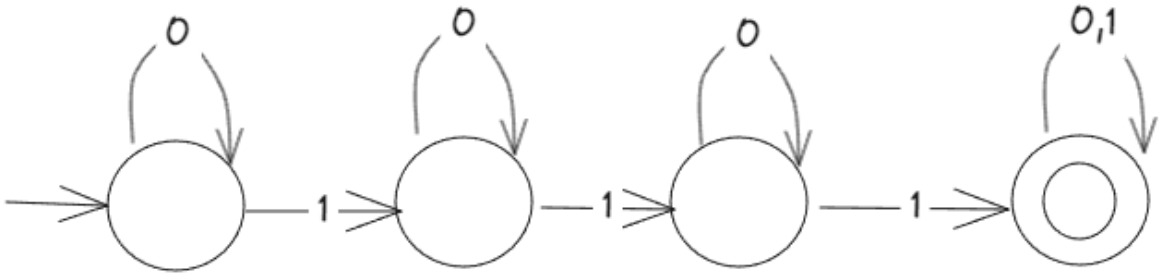
- M_1 does NOT accept
- M_2 accepts

Question 1.6

Give the state diagrams of **DFAs** that recognize the following languages over the alphabet $\{0, 1\}$

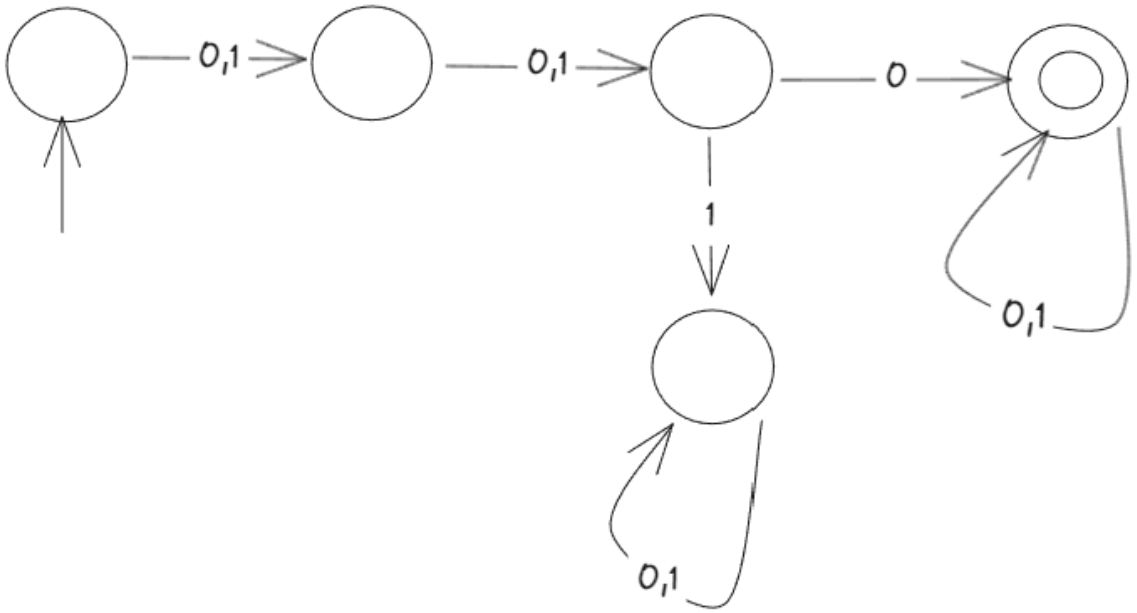
Part b

$L(M) = \{w \ : \ w \text{ contains at least three 1s}\}$



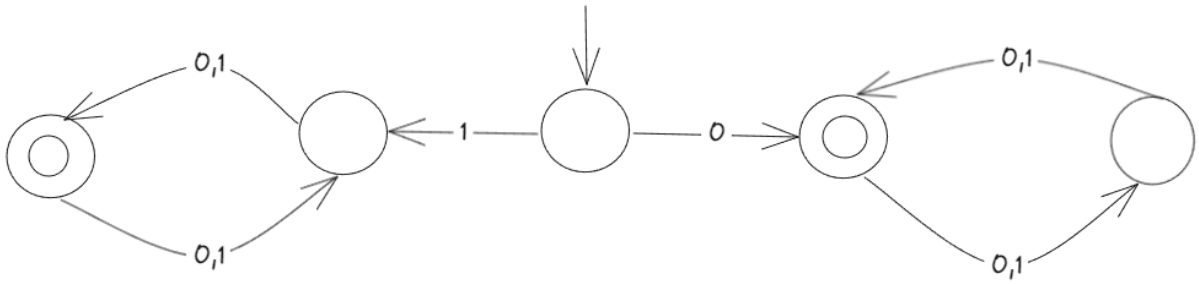
Part d

$L(M) = \{w = w_1 w_2 \dots w_n \ : \ |w| \geq 3 \ \wedge \ w_3 = 0\}$



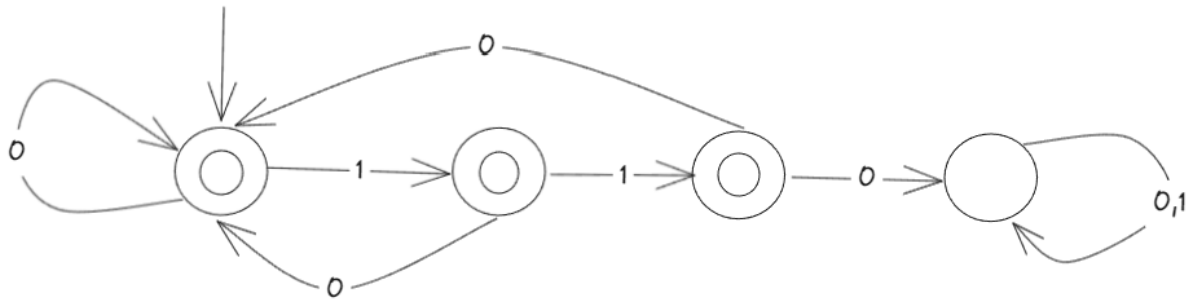
Part e

$L(M) = \{w = w_1 w_2 \dots w_n \ : \ \big(w_1 = 0 \wedge |w| \text{ is odd}\big) \vee \big(w_1 = 1 \wedge |w| \text{ is even}\big)\}$



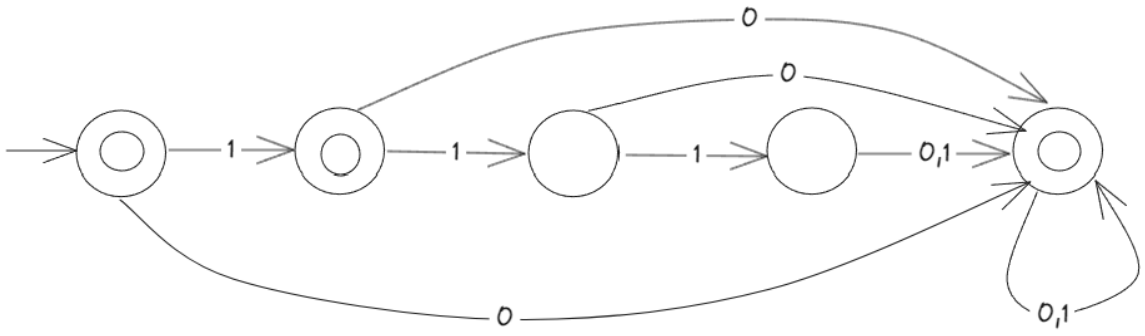
Part f

$L(M) = \{w \ : \ w \text{ doesn't contain } 110\}$



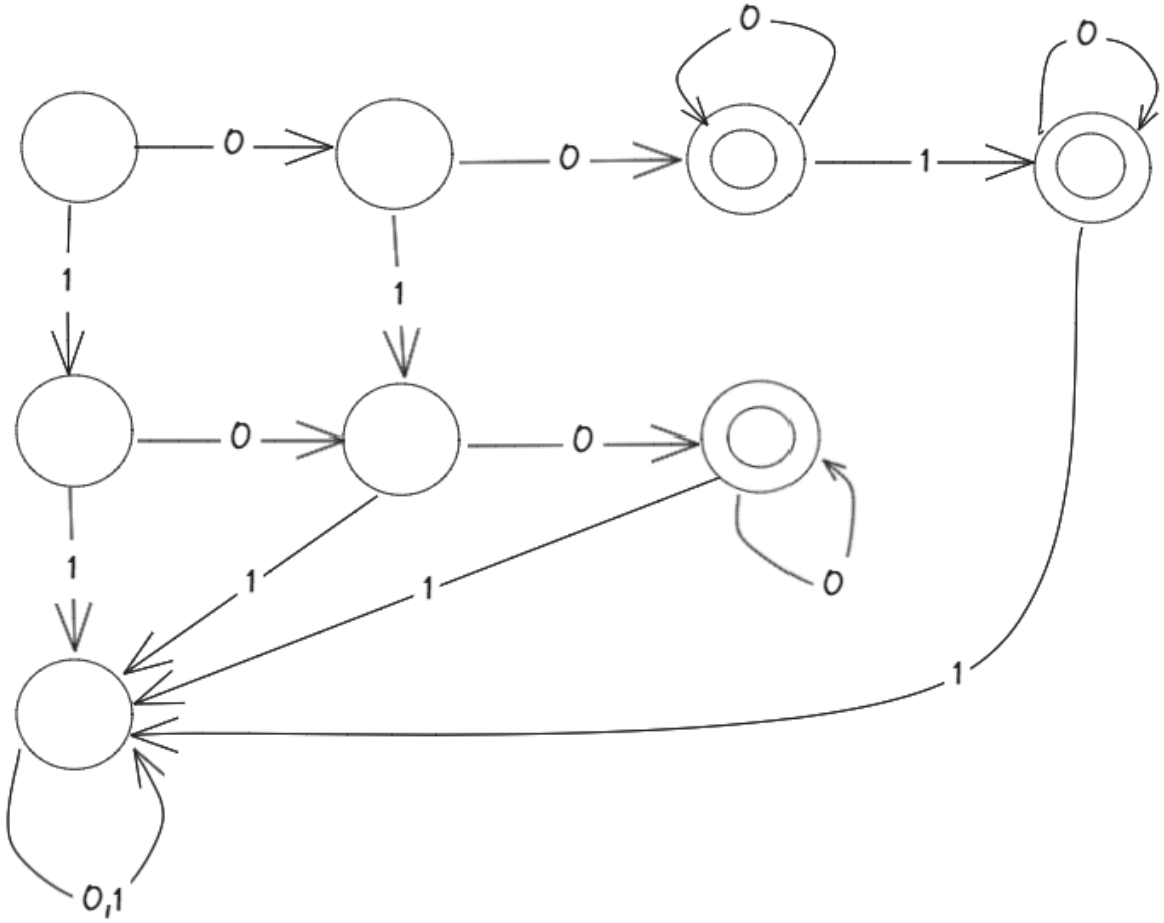
Part h

$L(M) = \{w \ : \ w \text{ is any string except 11 and 111}\}$



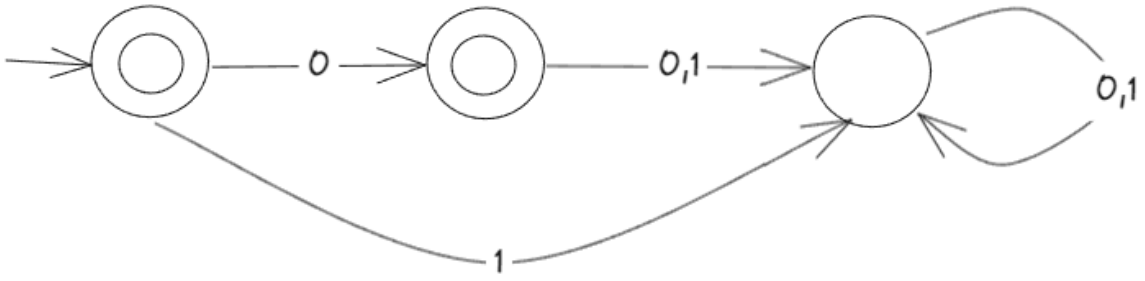
Part j

$L(M) = \{w \ : \ w \text{ contains at least two 0s and at most one 1}\}$



Part k

$L(M) = \{\varepsilon, 0\}$



Part n

$L(M) = \{0, 1\}^+$ (Kleene plus)