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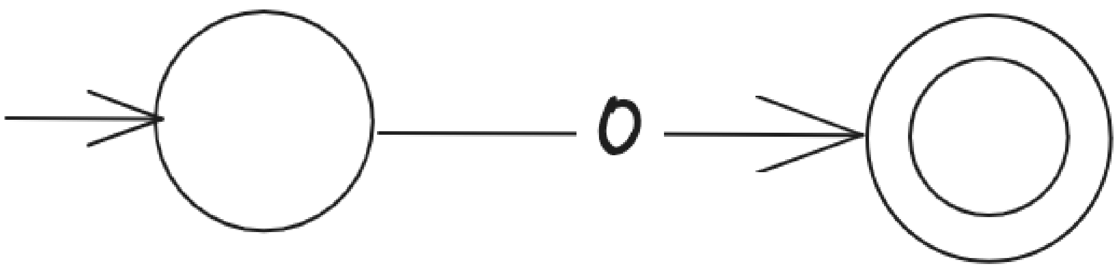
Question 1

Draw NFAs with the specified number of states over $\Sigma = \{0, 1\}$

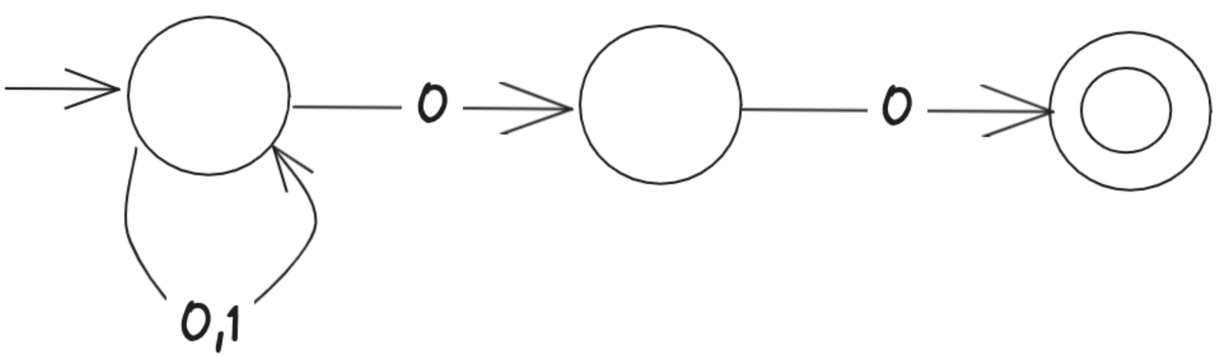
Part a

$L = \{0\}$ using 2 states



Part b

Language of all binary strings ending in 00, using 3 states

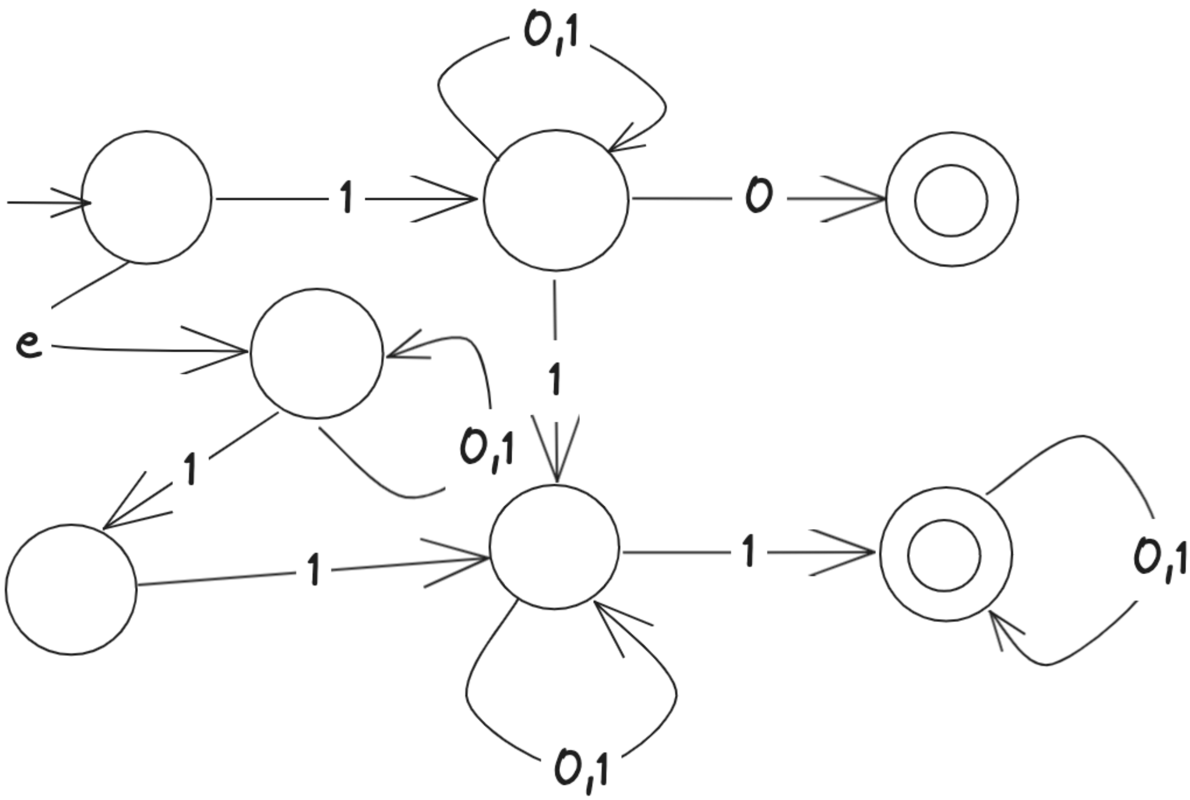


Question 2

Draw NFAs for the following

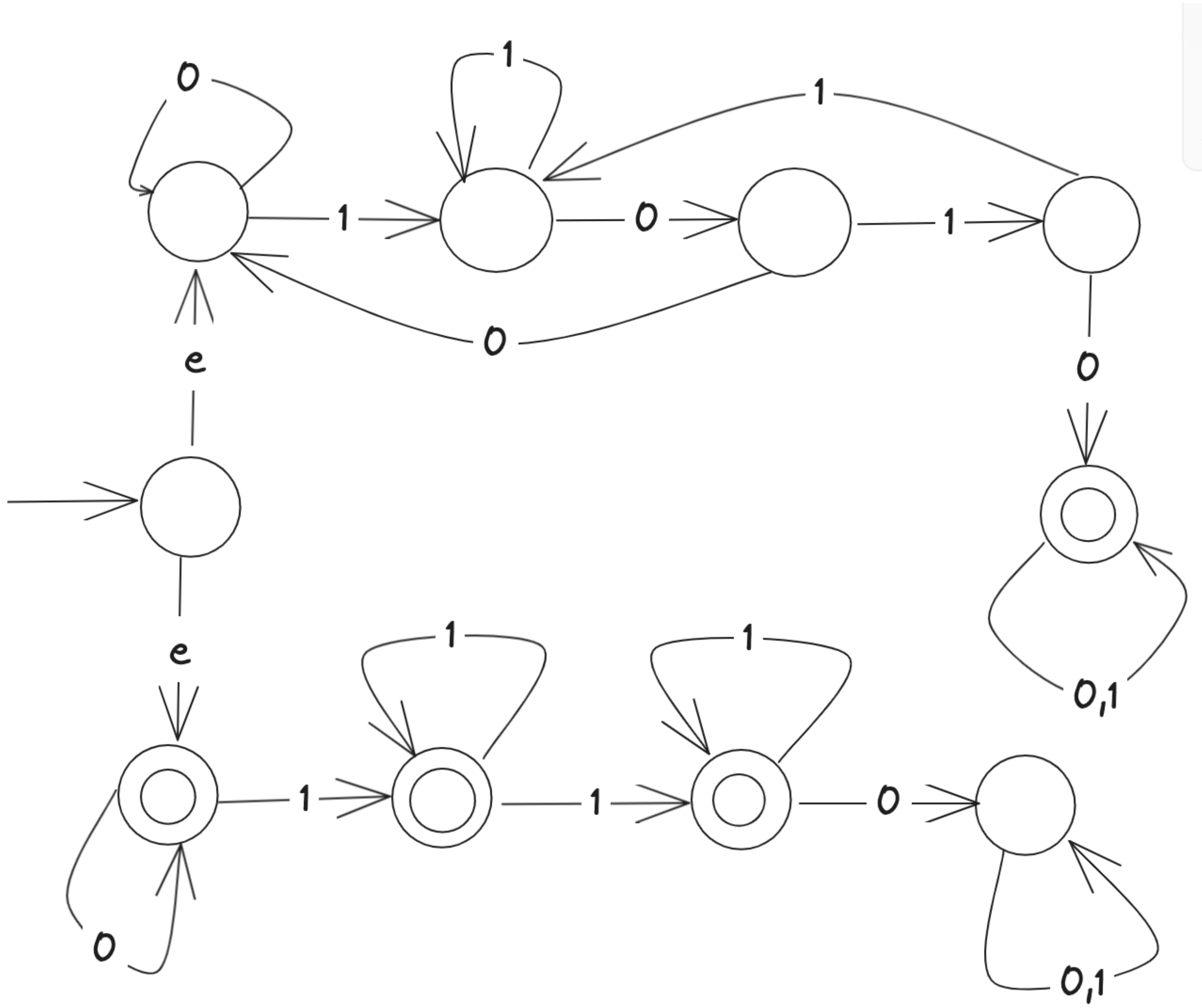
Part a

binary strings that begin with a 1 and end with a 0, or contain at least three 1s



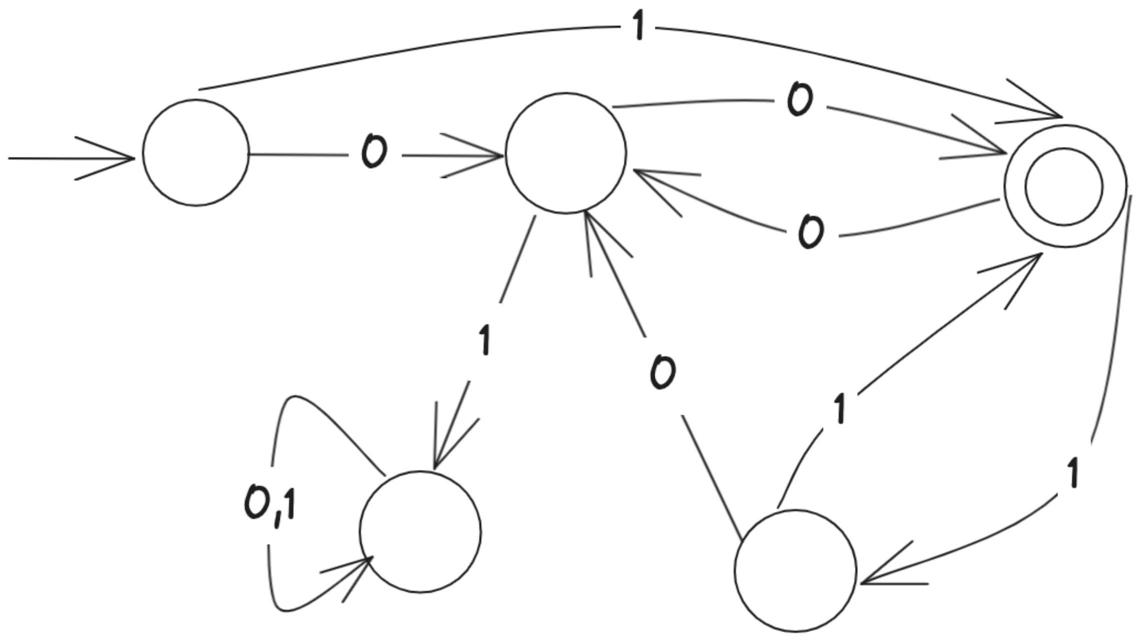
Part b

binary strings that contain the substring 1010 or do not contain the substring 110



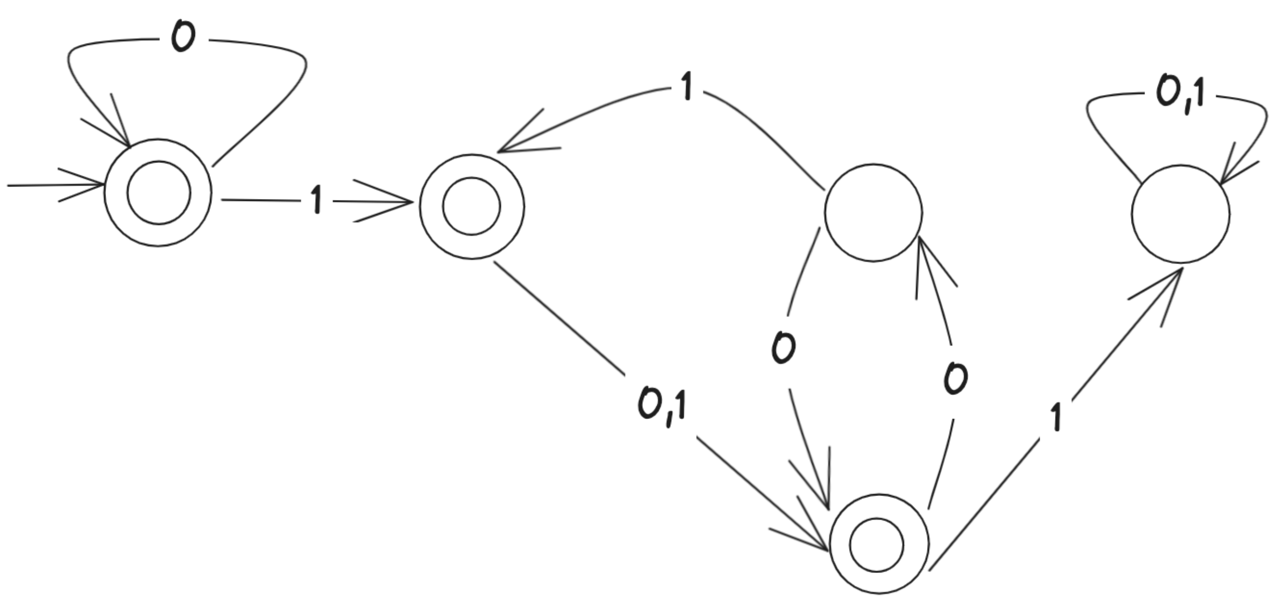
Question 3

Let L = {w : w contains an even number of 0s and an odd number of 1s and does not contain the substring 01}. Draw a DFA with five states that recognizes L.



Question 4

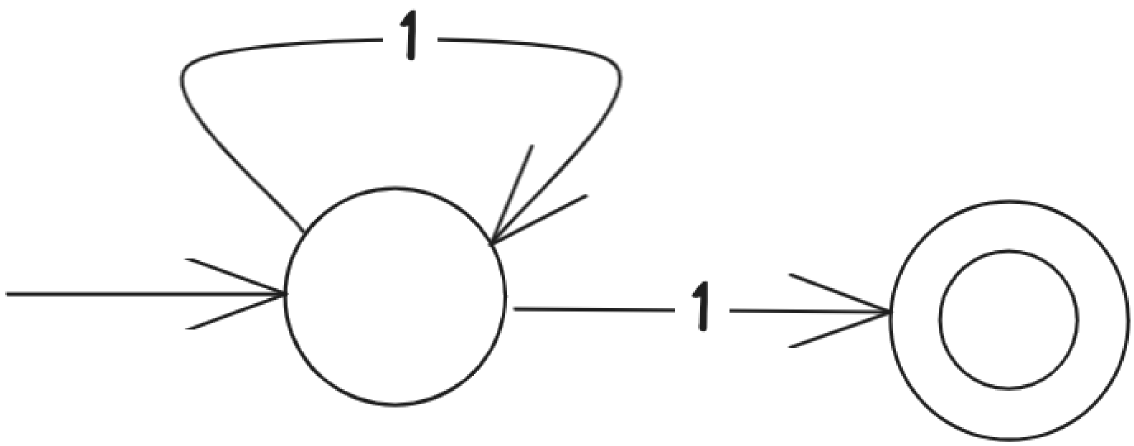
Let L be the language of all strings over {0, 1} that do not contain a pair of 1s that are separated by an odd number of symbols. Draw a DFA with five states that recognizes L.



Question 5

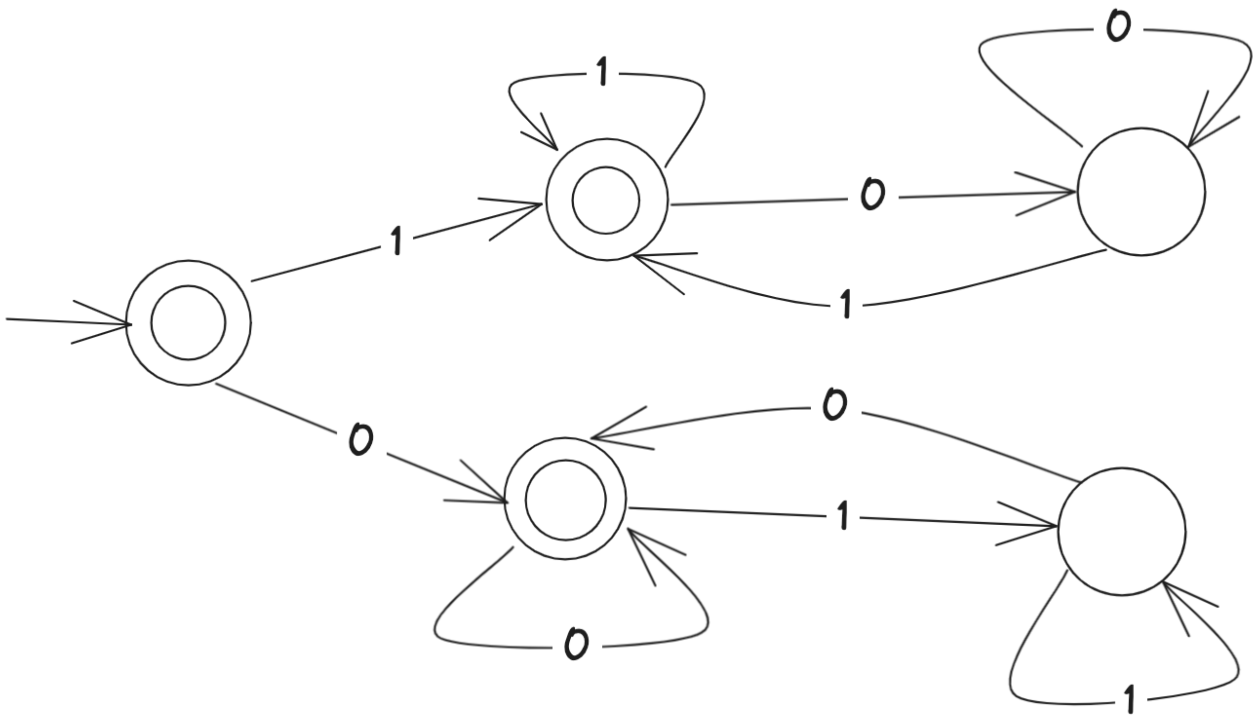
Let L_n be the language of all binary strings of the form $1_1 1_2 ... 1_k$ for some k that is a multiple of n. For each $n \geq 1$, construct a DFA or NFA that recognizes L_n.

I'm not sure this is the solution, but to generalize L_n overall n, I think the set of strings of the form 1^* Always has a length that is a multiple of some positive integer n thus there exists some language L_n for which this model recognizes, thus it recognizes all forms of L_n



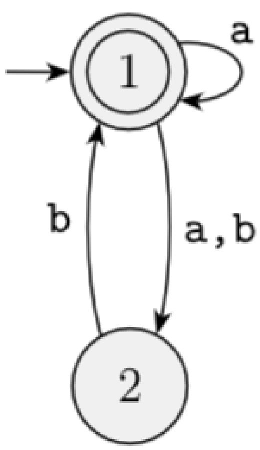
Question 6

Let D be the language of binary strings that contain an equal number of occurrences of the substrings 01 and 10. Thus $101 \in D$ because 101 contains a single 01 and a single 10, but $1010 \notin D$ because 1010 contains two 10s and one 01. Construct a DFA or NFA for D

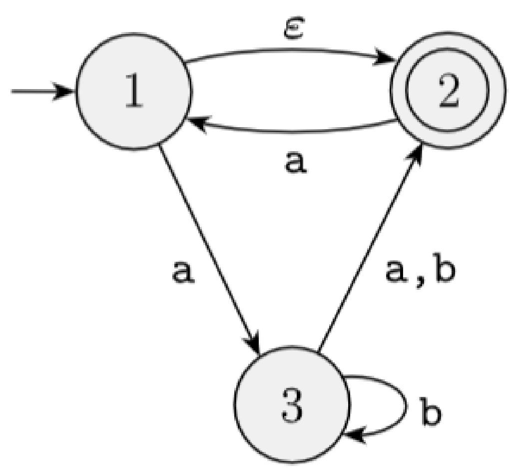


Question 7

Convert the following NFA to DFA

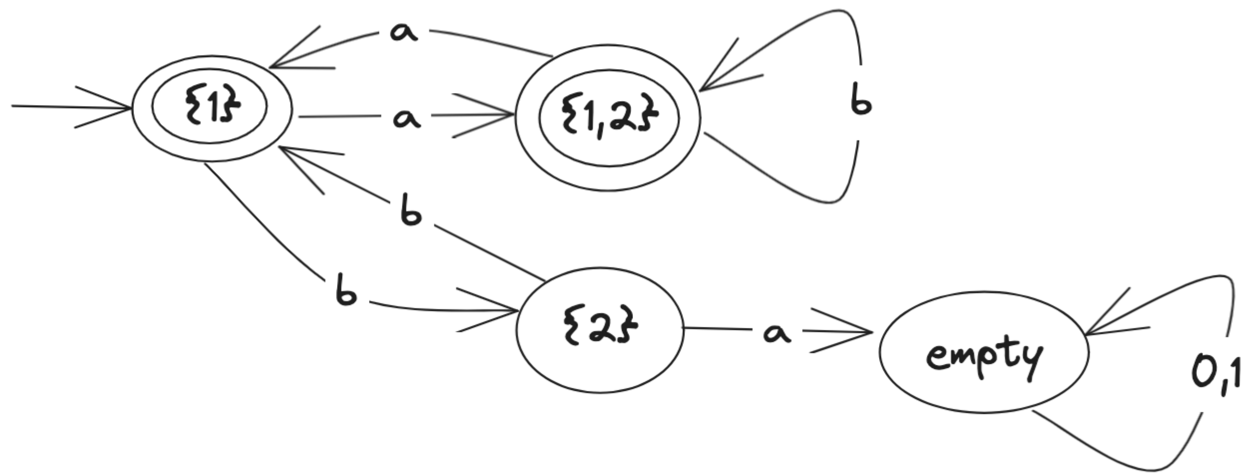


(a)



(b)

Part a



Part b