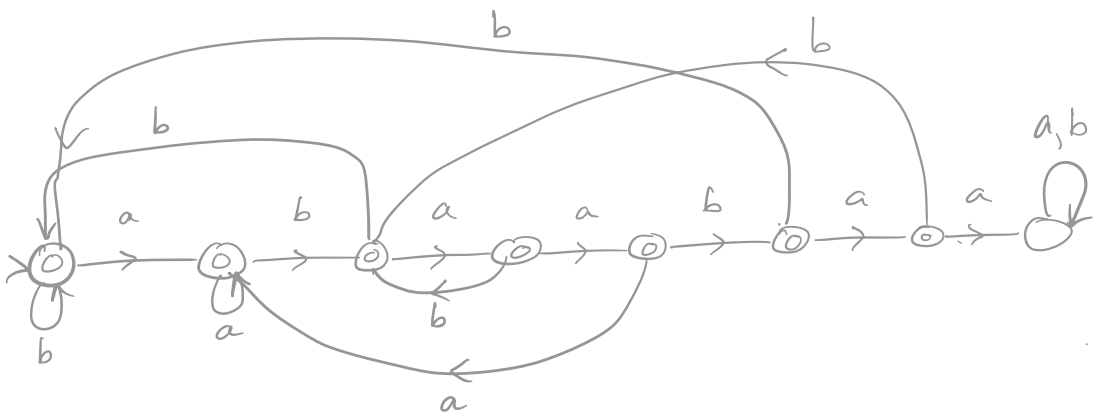
Assignment 1: Jan 20, 2026

Due Jan 27 midnight
Late submissions up to Jan 28 midnight 10% penalty.

Two of the following will be marked & recorded.

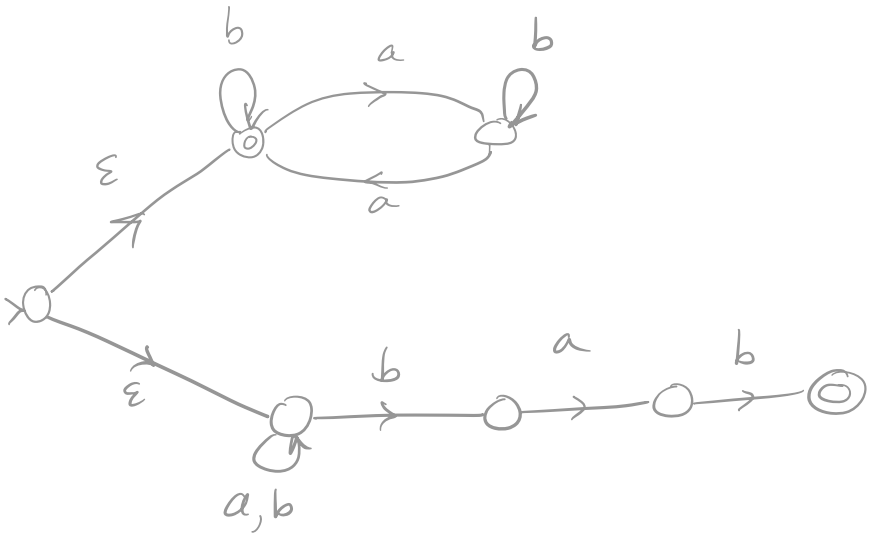
1. (8 marks) Give a DFA that recognizes the language

$\{w \in \{a,b\}^* \mid w$ does not contain abaabaa as a substring$\}$



2. (8 marks) Give a NFA for

$\{w \in \{a,b\}^* \mid$ w either contains an even # of a's or ends with bab (or both)$\}$



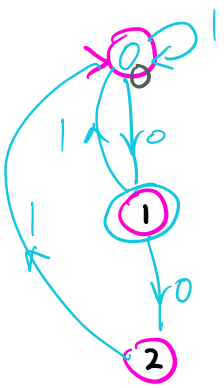
*3. (8 marks) Use the construction given in class to devise the DFA for the language $L_1 \cup L_2$

where: $L_1 = \{ w \in \{0,1\}^* \mid w \text{ does not end in } 00 \}$

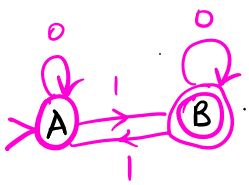
$L_2 = \{ w \in \{0,1\}^* \mid \#_1(w) \text{ is odd} \}$

Hint:

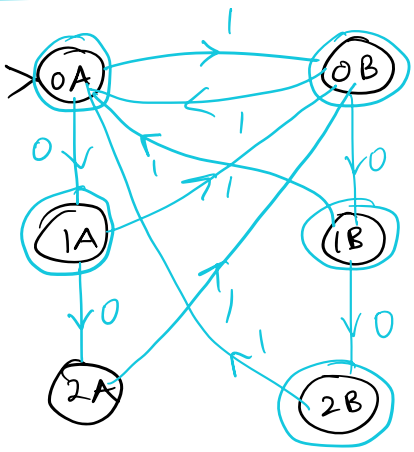
"w does not end in 00" (for you to do)



"$\#_1(w)$ is odd"

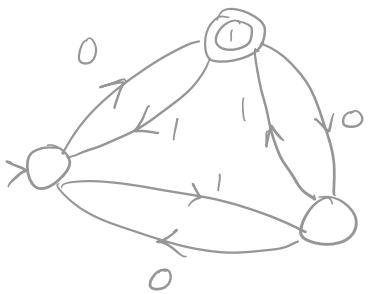


Solution:

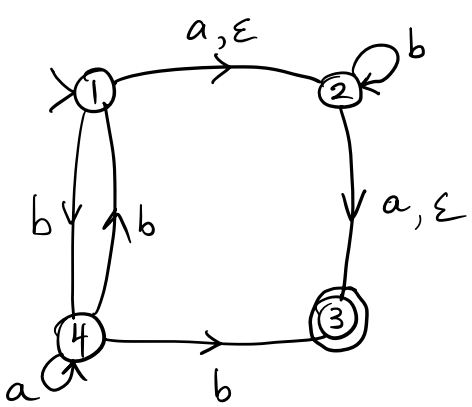


4. (8 marks) Construct a DFA that recognizes

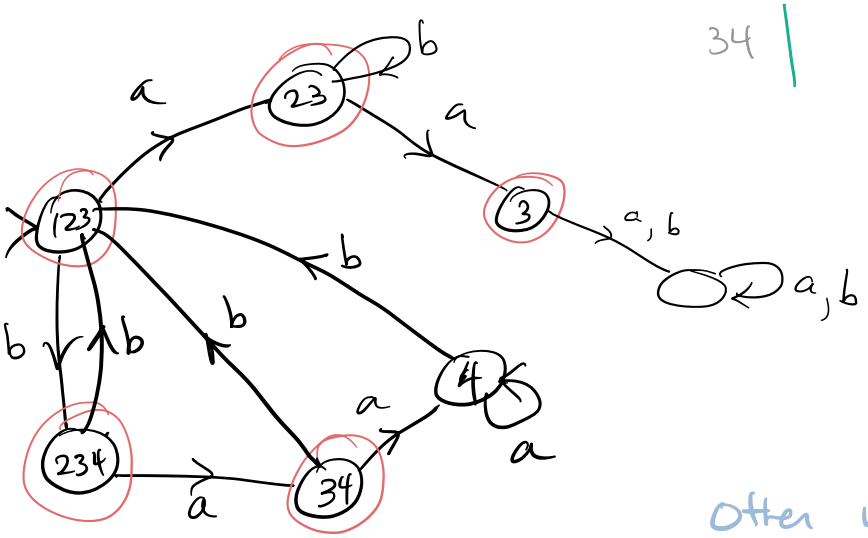
$$\{ w \in \{0,1\}^* \mid \#_0(w) - \#_1(w) \equiv 1 \bmod 3 \}$$



* 5. (8) Give a DFA that is equivalent to the following NFA by using the algorithm given in class.



	a	b
1	23	4
2	3	23
3	∅	∅
4	4	123
> 123	23	234
23	3	23
234	34	123



34 | 4 | 123

Other method :

	a	b
1	23	234
2	3	23
3	∅	∅
4	4	123
123	23	234
23	3	23
234	34	123
34	4	123