DISCUSSION 04/12

For definitions, refer Sipser.

$\Sigma = \{a, b\}$

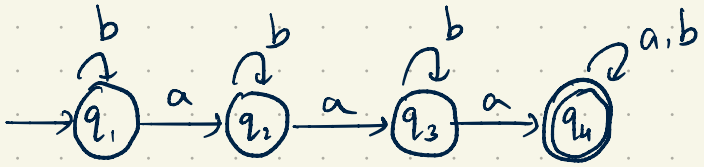
1.4 (a) $\{w \mid w$ has at least 3 a's & at least 2 b's$\}$

Sol: We want the intersection of 2 DFAs M_1 & M_2

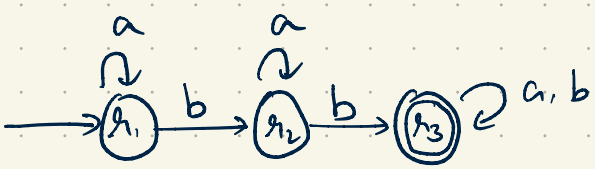
M_1 recognizes $\{w \mid w$ has at least 3 a's$\}$

M_2 recognizes $\{w \mid w$ has at least 2 b's$\}$

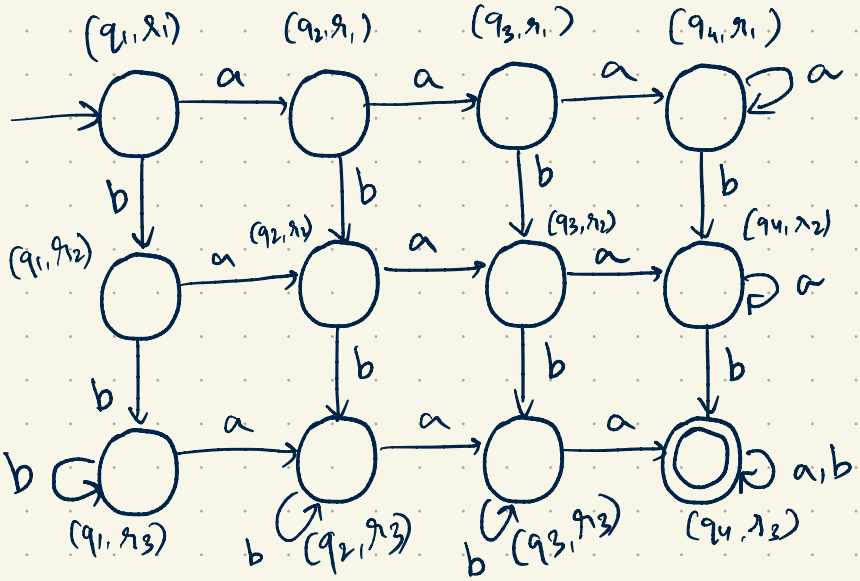
M1



M2



$M_1 \cap M_2$



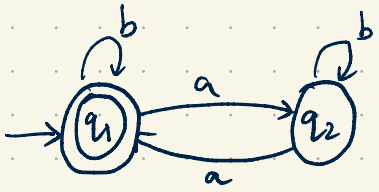
1.4 (c) $\{w \mid w$ has an even number of 'a's and 1 or 2 'b's$\}$

Sol: Want $M_1 \cap M_2$, where

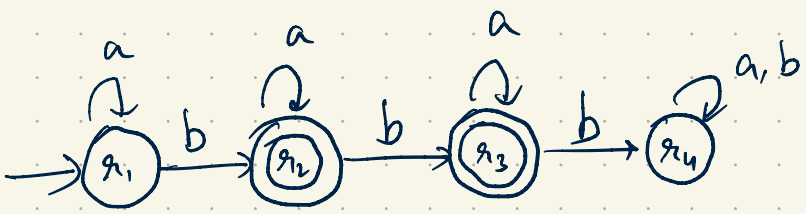
M_1 recognizes $\{w \mid w$ has an even number of 'a's$\}$

M_2 recognizes $\{w' \mid w'$ has 1 or 2 'b's$\}$

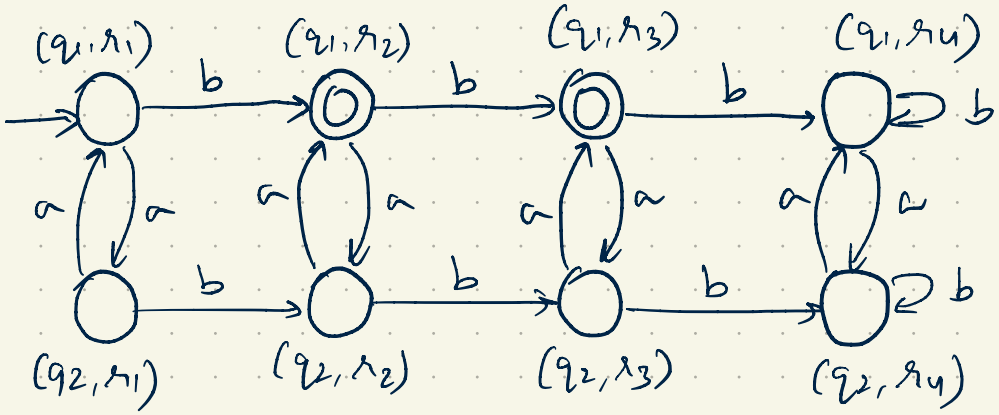
M1



M2



$M_1 \cap M_2$



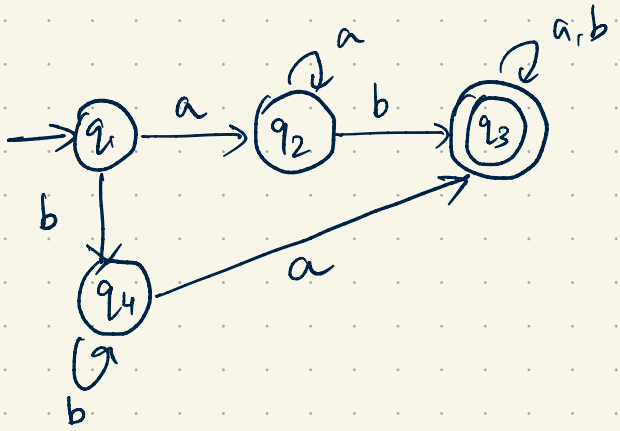
1.5 (c) Construct a DFA that recognizes

$L = \{w \mid w$ contains neither ab nor ba$\}$

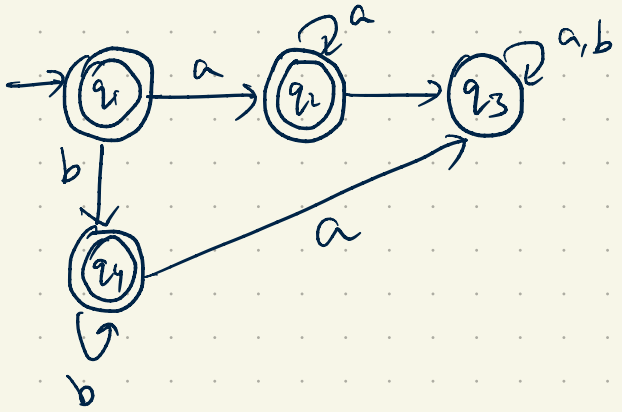
The complement of this language is

$\bar{L} = \{w \mid w$ contains ab or contains ba$\}$

DFA that recognizes $\overline{L}$:

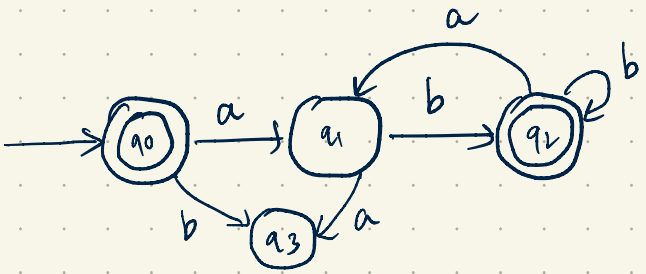


Complement this to get the DFA that recognizes L:



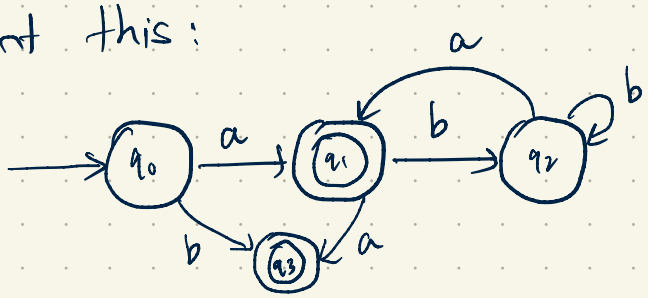
1.5(e) $\{w \mid w$ is any string NOT in $(ab^+)^*\} = L$

$\overline{L} = \{w \mid w$ is in $(ab^+)^*\}$



recognizes $\overline{L}$

Complement this:



recognizes L

1-6 (i) Construct a DFA that recognizes

$$\{w \mid \text{every odd position of } w \text{ is a } 1\}$$

over $\Sigma = \{0,1\}$

Sol Important : ε (empty string) BELONGS to this language.