

Theory of Computation

Exercise 4: *↑ បើបញ្ហាខ្លះមិនដឹងពីលទ្ធផល បើបញ្ហាដឹងពីលទ្ធផល បើបញ្ហាដឹងពីលទ្ធផល* បើបញ្ហាដឹងពីលទ្ធផល $\{DFA, NFA, R.E\}$

(Closure properties of Regular Language and Regular Expression)

1. Prove that the language $\{a^m b : m \geq 1 \text{ and } m \neq 100\}$ is regular.

ឆ្លើយ: បើបញ្ហាខ្លះមិនដឹងពីលទ្ធផល បើបញ្ហាដឹងពីលទ្ធផល បើបញ្ហាដឹងពីលទ្ធផល
 $a^{100}b \rightarrow \text{Reg? បើបញ្ហាខ្លះមិនដឹងពីលទ្ធផល} \rightarrow a^{100}b$

finite automata \rightarrow ត្រូវតែមាន state តិចតួច

complement of reg is reg

$\overline{a^{100}b} : \text{Reg}$

anything - $\{a^{100}b\}$

\rightarrow ត្រូវតែមាន $a \cdot a^* \cdot b$

$aa^*b \cap \overline{a^{100}b} \neq \emptyset$

ឆ្លើយ: បើបញ្ហាខ្លះមិនដឹងពីលទ្ធផល

\downarrow
ឆ្លើយ: បើបញ្ហាខ្លះមិនដឹងពីលទ្ធផល
បើបញ្ហាដឹងពីលទ្ធផល

2. Find regular expression for the following language

$$L = \{ w \in \{a, b\}^* : \underline{w \text{ does not end with } ab} \}$$

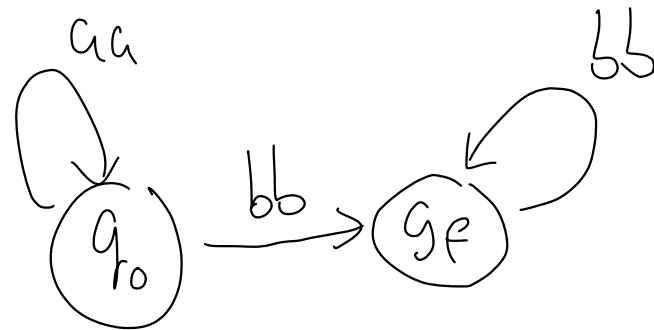
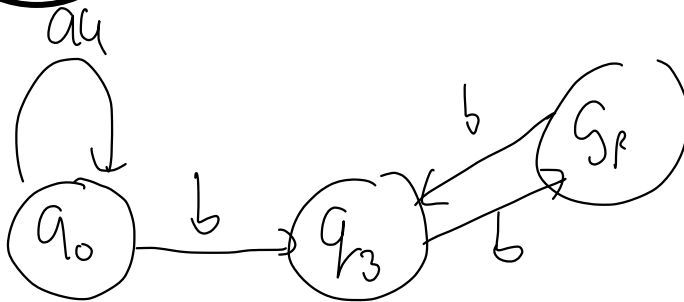
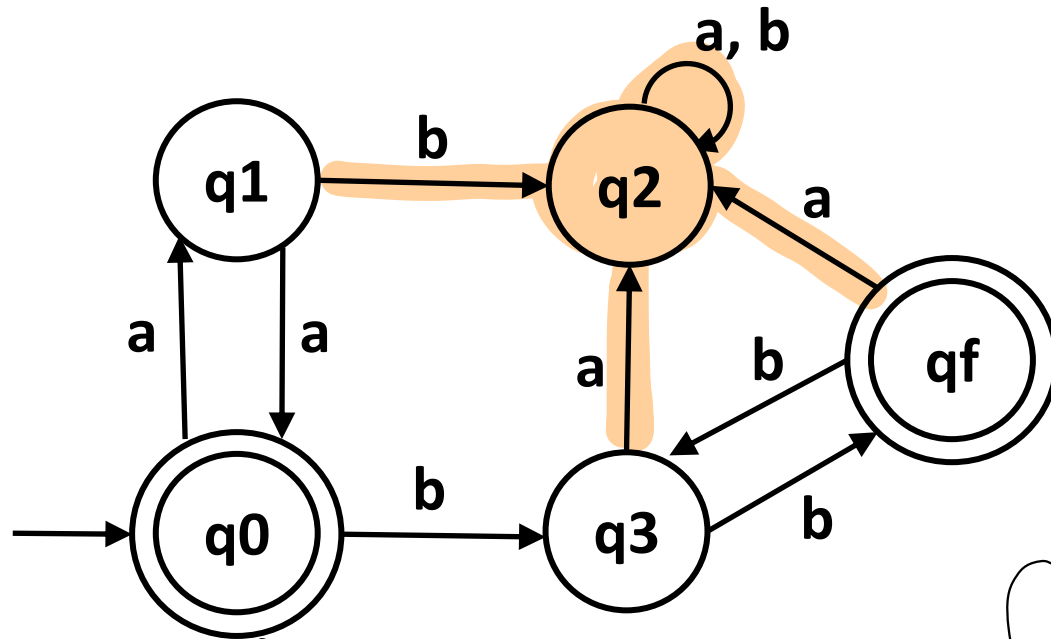
egs: $L = \{ \lambda, a, b, aa, ba, bb, aaa, aba, abb, bac, bba, bbb, \dots \}$

$$(a+b)^* \cdot (aa+ba+bb) + \underline{(a+b)^*}$$

r

*3. Find regular expression for the following DFA.

(Submit 3)



$(aa)^*bb(bb)^*$

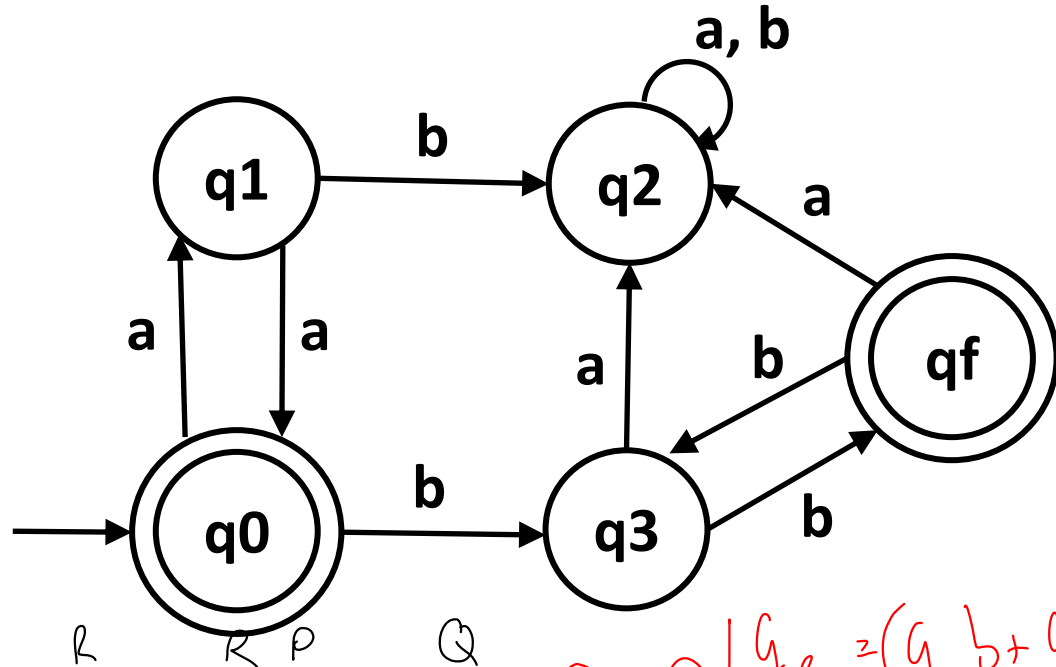
$$R = Q + RP$$

$$E + RP^* = P^*$$

$$R = QP^*$$

*3. Find regular expression for the following DFA.

(Submit 3)



$$g_0 = g_1 a + \epsilon \quad \text{--- (1)}$$

$$g_1 = g_0 a \quad \text{--- (2)}$$

$$g_2 = g_1 b + g_2 a + g_2 b + g_1 a + g_4 a \quad \text{--- (3)}$$

$$g_3 = g_0 b + g_f b \quad \text{--- (4)}$$

$$g_f = g_3 b \quad \text{--- (5)}$$

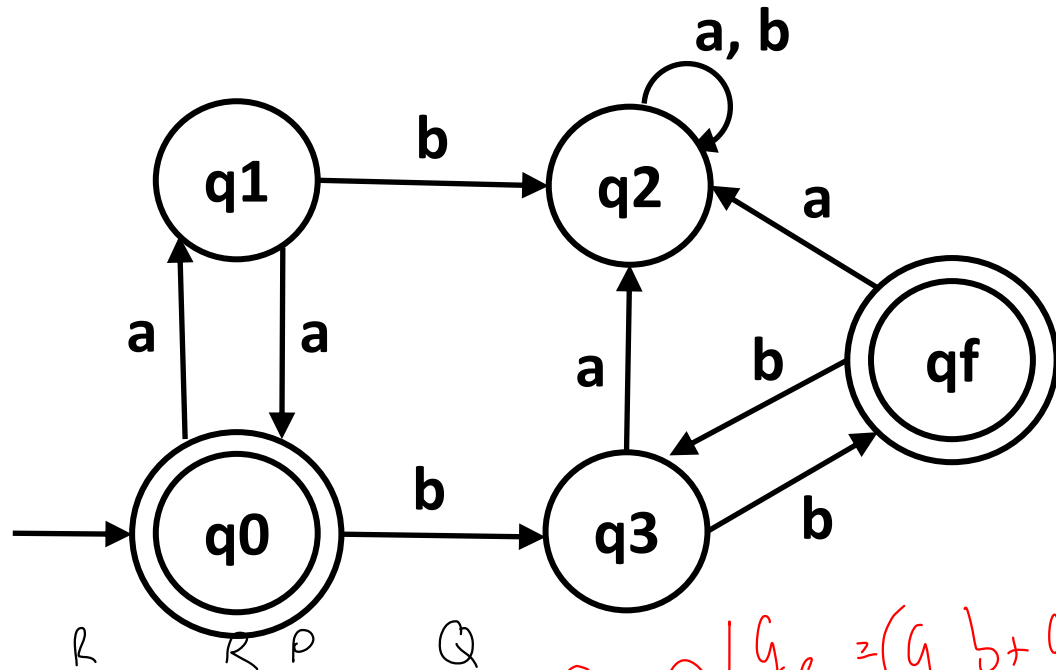
$$\begin{aligned}
 g_0 &= g_0 a a + \epsilon \\
 &= \epsilon (aa)^* \\
 &= (aa)^*
 \end{aligned}$$

$$\begin{aligned}
 g_f &= (g_0 b + g_f b) b \quad \text{--- (5) } \leftarrow \text{--- (4)} \\
 &= g_0 b b + g_f b b \\
 &= \underbrace{(aa)^* b b}_{Q} + g_f b b \quad \text{--- (R P)} \\
 g_f &= (aa)^* b b (bb)^*
 \end{aligned}$$

$$\begin{aligned}
 g_0 + g_f &= (aa)^* + (aa)^* b b (bb)^* \\
 &= (aa)^* (\epsilon + b b (bb)^*) \\
 &= (aa)^* (bb)^*
 \end{aligned}$$

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