27.02.2025

Seminar 1 LFA

L_1, L_2 = mult. de cuvinte

$L_1 \cup L_2 = \{ w \mid w \in L_1 \text{ sau } w \in L_2 \}$

$L_1 \cdot L_2 = \{ w_1 \cdot w_2 \mid w_1 \in L_1 \text{ și } w_2 \in L_2 \}$

$(L_n)^* = \{(L_n)^n, n \geq 0 \ (n \in \mathbb{N})$

$= \underbrace{(L_n)^0}_{\{\lambda\} \text{(lamda)}, \ \varepsilon \text{(epsilon)}} \cup (L_n)^1 \cup \ldots \cup (L_n)^n =$

$L^* = \{\lambda\} \cup L^+$

$L^* \supseteq L^+$

$L^* \setminus \{\lambda\} = L^+ \Leftrightarrow \lambda \notin L$

$(L_n)^+ = (L_n)^n, n \geq 1 \ (n \in \mathbb{N})$

$= (L_n)^1 \cup (L_n)^2 \cup \ldots (L_n)^n$

① $L_1 = \{aa, ab\}$

$L_2 = \cancel{\{a, bc, d\}}$

$\{bc, ddd\}$

$L_1 \cdot L_2 = \{aabc, aaddd, abbc, abddd\}$

$L_2 \cdot L_1 = \{bcaa, bcab, dddaa, dddab\}$

② $L_3 = \{a, bc, d\}$

$L_3^* = \cancel{L_3^0 \cup} \{\lambda\} \cup \{a, bc, d\} \cup \{aa, abc, ad, bca, bcbc, bcd, da, dbc, dd\}$

$\cup \ldots$

$(ab)^k = ab\cancel{ab}abab \ldots ab \neq a^k b^k$

$ab^k = abb \ldots b$

AFD = Automate finale deterministe

$AFD = (Q, \Sigma, \delta, q_0, F)$

Q = mulțime stări (finită, nevidă)

Σ = alfabetul de intrare (mulțime simboluri, mulț. finită)

$q_0 \in Q$ starea inițială (există și este unică)

$\cancel{F \in Q}$

$F \subseteq Q$ mulț. stări finale

$\cancel{\delta : q_0 \to Q}$

δ funcția de tranziție

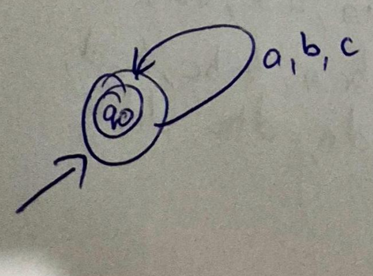
$\delta : Q \times \Sigma \to Q$

$L_1 = \{a, b, c\}^*$

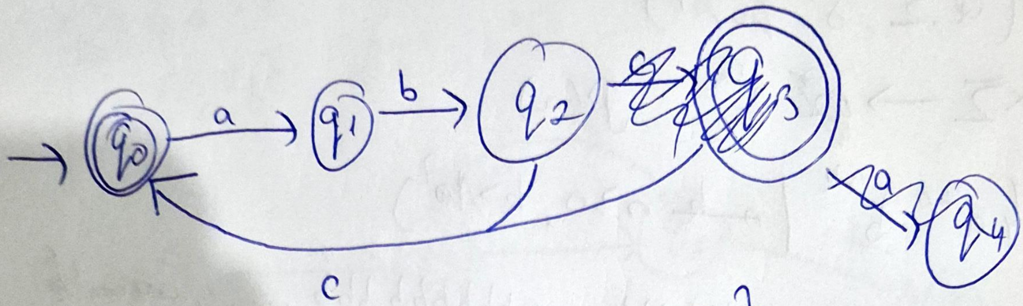
$L_2 = (abc)^*$

$L_3 = \{a^n b^k c^p \mid n \geq 0, k \geq 0, p \geq 0\}$

$L_1 = \{a, b, c\}^* = \{\lambda, a, b, c, aa, ab, ac, ba, bb, bc, \ldots, aaa, aab, aba, \ldots\}$

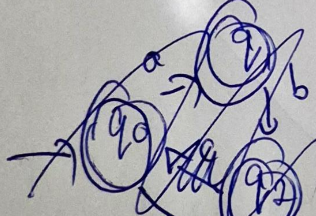


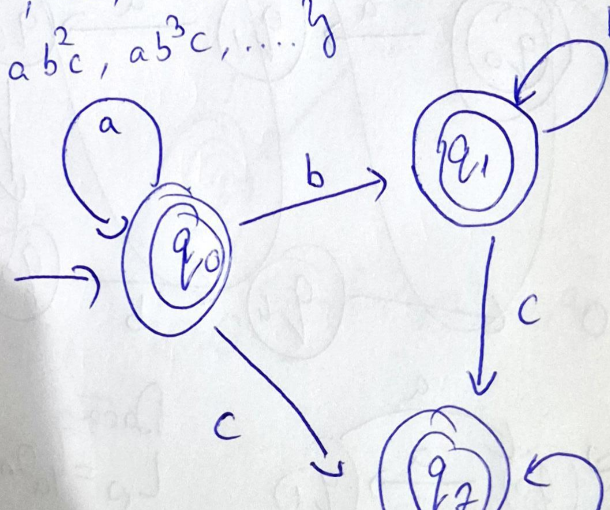
$L_2 = (abc)^* = \{\lambda\} \cup \{abc\} \cup \{abcabc\} \cup \{abcabcabc\} \cup \ldots$



$L_3 = \{a^n b^k c^p \mid n \geq 0,\ k \geq 0,\ p \geq 0\}$

$L_3 = \{\lambda, a, a^2, \ldots, b, b^2, \ldots, c, c^2, \ldots, ab, a^2b, \ldots, ab, ab^2, \ldots, abc,$
$ac, a^2c, \ldots, bc, b^2c, \ldots,$
$a^2bc, \ldots, ab^2c, ab^3c, \ldots\}$





Automate finite nedeterministe

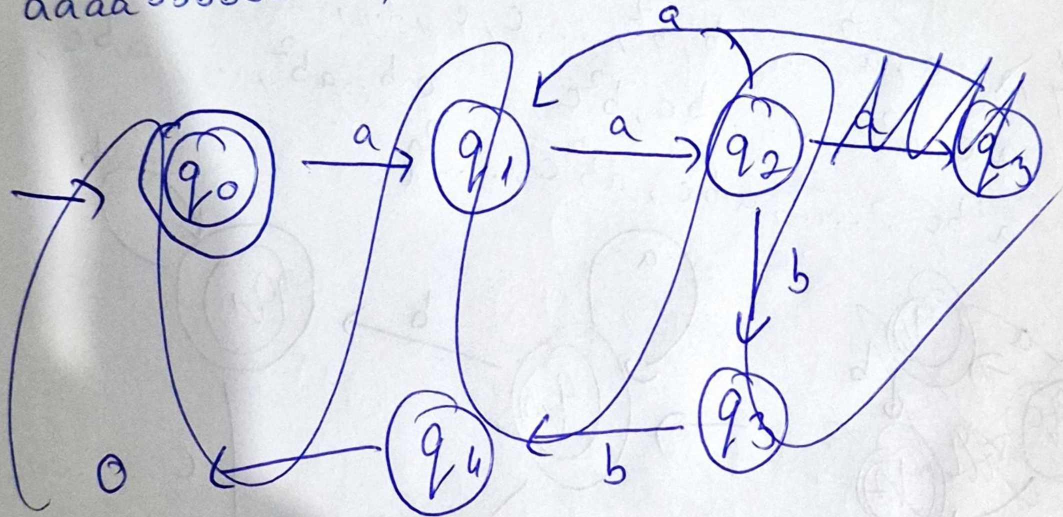
$AFN = (Q, \Sigma, \delta, q_0, F)$

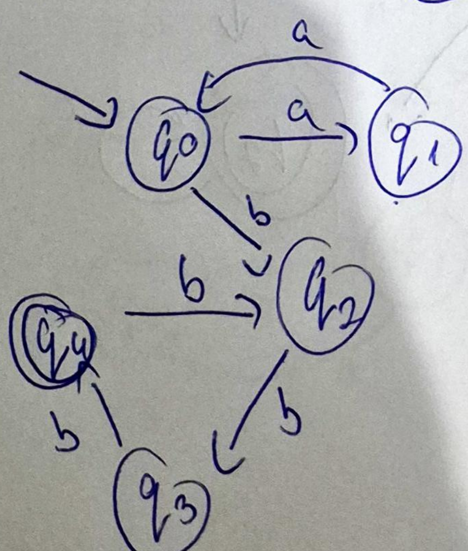
$\delta : Q \times \Sigma \longrightarrow 2^Q \qquad P(Q)$

$L_p = \{ a^{2n} b^{3k} \mid \cancel{n, k}\ n \geq 0, k \geq 1 \}$

$L_p = \{ \cancel{\varepsilon}, aabbb, aabbbbbb, aabbbbbbbbb, \dots, aaaab^6$

$aaaabbbbbbbbb, aaaa b^9 b^9, \dots, a^6 b^9 \dots a^6 b^{12}, \dots \}$





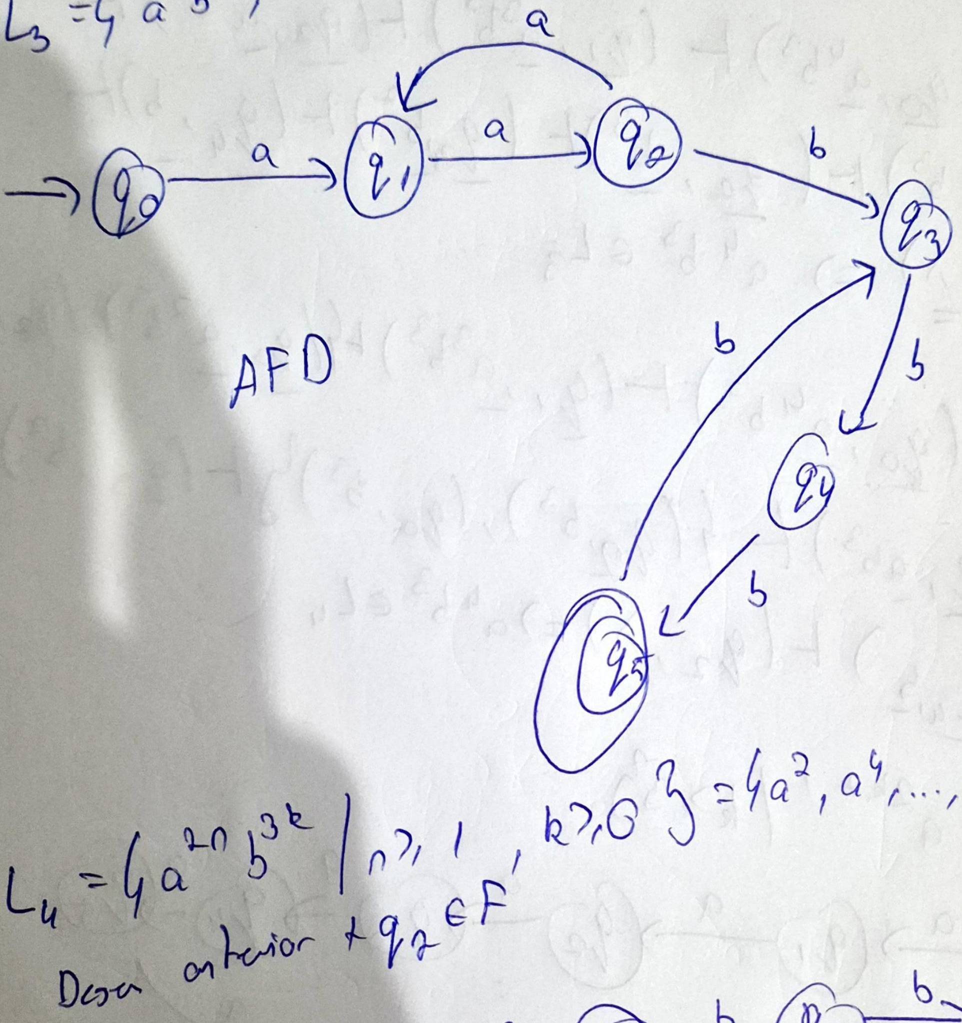
Dacă

$L_p = \{ a^{2n} b^{3k} \mid n \geq 0, k \geq 0 \}$

$q_0 \in$ ~~stare finală~~ F

$L_3 = \{a^{2n} b^{3k} \mid n \geq 1 ; k \geq 1\}$

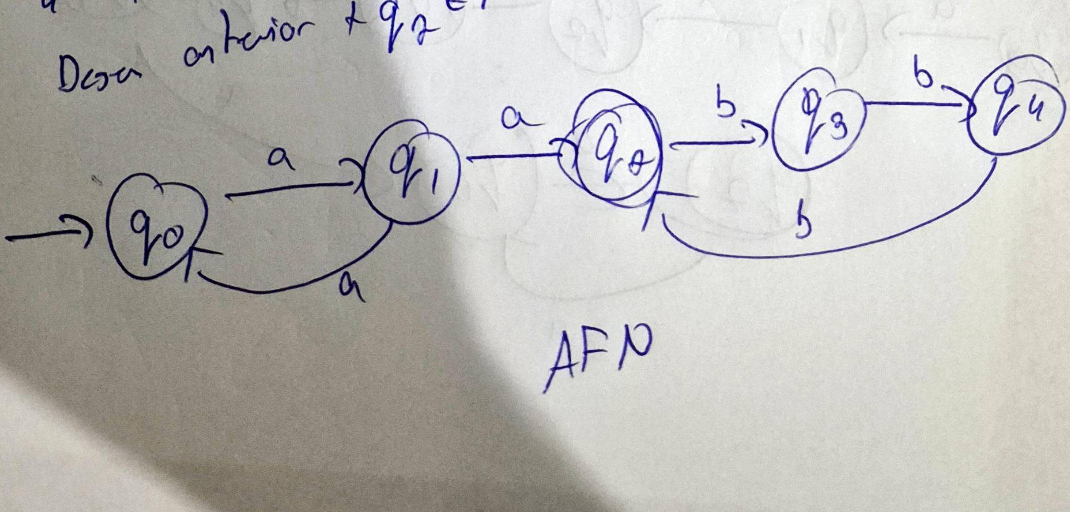
$L_3 = \{a^2b^3, a^2b^6, a^2b^9, \ldots, a^4b^3, a^4b^6, \ldots\}a$



AFD

$L_4 = \{a^{2n} b^{3k} \mid n \geq 1, k \geq 0\} = \{a^2, a^4, \ldots, a^2b^3, a^2b^6, \ldots\}$

Desde anterior + $q_2 \in F$



AFN

Verificare acceptare cuvânt:

configurație (stare curentă, cuv. rămas de procesat)

AFD: $(\underline{q_0}, \underline{a}^4b^3) \vdash (\underline{q_1}, \underline{a}^3b^3) \vdash (\underline{q_2}, \underline{a}^2b^3) \vdash$
$\vdash (\underline{q_1}, \underline{a}b^3) \vdash (\underline{q_2}, \underline{b}^3) \vdash (\underline{q_3}, \underline{b}^2) \vdash (\underline{q_4}, \underline{b}) \vdash$
$\vdash (q_5, \underline{\lambda}) \Rightarrow a^4b^3 \in L_3$

$\in F$

AFN: $(\underline{q_0}, \underline{a}^4b^3) \vdash (\underline{q_1}, \underline{a}^3b^3) \vdash \{(\underline{q_0}, \underline{a}^2b^3), (q_2, a^2b^3)\} \vdash$
$\vdash (\underline{q_1}, \underline{a}b^3) \vdash \{(\underline{q_2}, b^3), (q_0, b^3)\} \vdash (q_3, b^2) \vdash$
$\vdash (\underline{q_4}, \underline{b}) \vdash (q_2, \lambda) \Rightarrow a^4b^3 \in L_4$

$L = \{a^{2k+1} \mid k \geq 3\}$