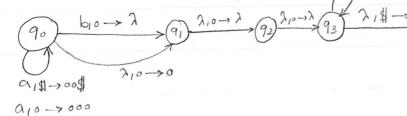


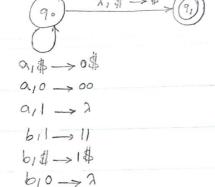
3)
$$S \rightarrow a Sbb | a$$

$$L = a^{n+1} b^{2n}$$

idea: for every a push 2 zeros pop 2 extra o for the first b

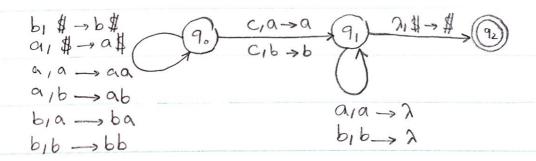


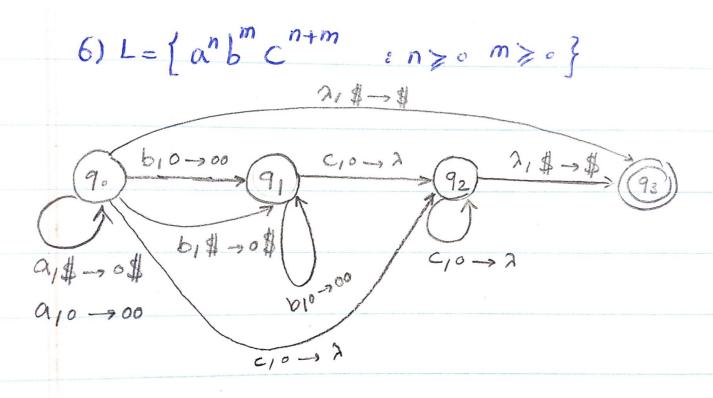
2) $L = \{ w \in \{a_1b_3^{**}, n(w) = n(w) \}$



$$218 \rightarrow aA$$
 $b_1b \rightarrow \lambda$
 $a_1a \rightarrow \lambda$ $\lambda_1B \rightarrow b$
 $\lambda_1A \rightarrow aABC$ $\lambda_1C \rightarrow c$
 $\lambda_1A \rightarrow bB$ $c_1c \rightarrow \lambda$
 $\lambda_1A \rightarrow a$

5) L = [WCWR | WE Taib]*





7)
$$L = \{a^n b^m \mid n \leqslant m \leqslant 3n \mid n \geqslant 0\}$$

$$Q_0 \qquad b_{10} \rightarrow \lambda \qquad q_1 \qquad q_2 \qquad q_2 \qquad q_2 \qquad q_3 \qquad q_4 \qquad q_4 \qquad q_5 \qquad q_5 \qquad q_5 \qquad q_6 \qquad$$

8)
$$L = \{ w : n_{\alpha}(w) = n_{b}(w) + 1 \}$$
 $Z = \{a_{1}b_{3}\}$

9) $S \rightarrow aSTb$ $S \rightarrow b$ $T \rightarrow Ta$
 $A_{1} \not= A_{2} \Rightarrow A_{3} \Rightarrow A_{4} \Rightarrow A_{5} \Rightarrow A_{5}$

a18-308

II) $L = \{ \omega \omega^{A} : \omega \in \{a_{1}b\}^{*} \}$ $\begin{array}{c} \lambda_{1}b \rightarrow b \\ q_{1}a \rightarrow \lambda \end{array}$ $\begin{array}{c} \lambda_{1}b \rightarrow b \\ q_{2}a \rightarrow a \\ h \downarrow b \rightarrow bb \end{array}$ $\begin{array}{c} \lambda_{1}b \rightarrow b \\ q_{1}a \rightarrow a \\ h \downarrow a \rightarrow ba \end{array}$ $\begin{array}{c} \lambda_{1}b \rightarrow b \\ q_{2}a \rightarrow a \\ h \downarrow a \rightarrow ab \end{array}$

12) L= {a"b" 9,9-9010 610->7