Cale Bierman

Homework 1

Let $\Sigma = \{0, 1, \ldots, 9, \text{,}\}$ $a = \{0, 1, \ldots 9\}$ Page 1

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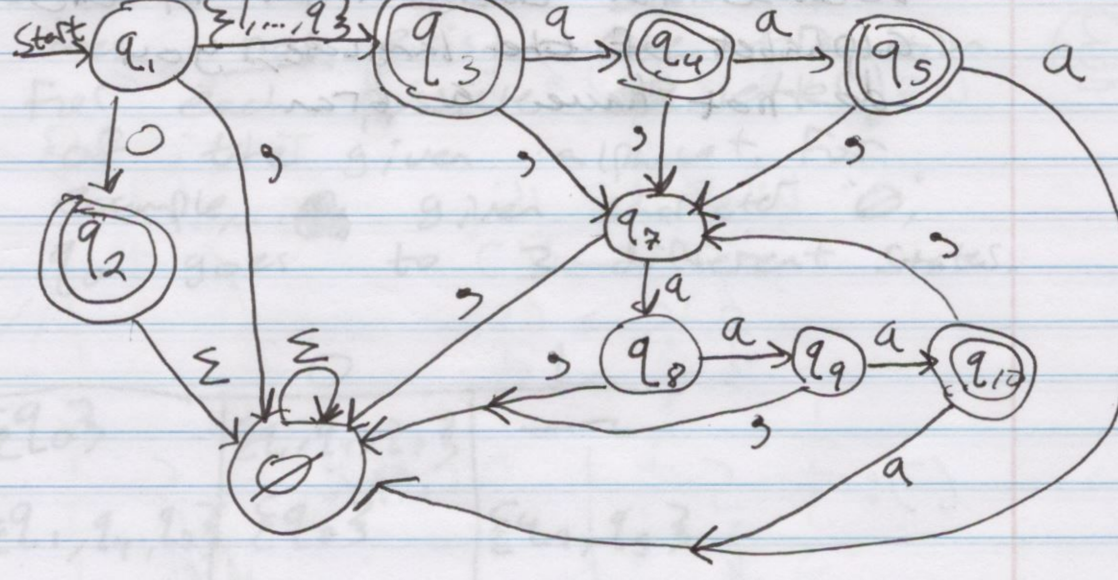

1,000: $\xrightarrow{start} q_1 \xrightarrow{1} q_3 \xrightarrow{,} q_7 \xrightarrow{0} q_8 \xrightarrow{0} q_9 \xrightarrow{0} q_{10}$

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$\xrightarrow{,} q_7 \xrightarrow{0} q_8 \xrightarrow{0} q_9 \xrightarrow{0} q_{10}$

42: $\xrightarrow{start} q_1 \xrightarrow{4} q_3 \xrightarrow{2} q_4$

[redacted]

9,87: $\xrightarrow{start} q_1 \xrightarrow{9} q_3 \xrightarrow{,} q_7 \xrightarrow{8} q_8 \xrightarrow{7} q_9$

007: $\xrightarrow{start} q_1 \xrightarrow{0} q_2 \xrightarrow{0} \emptyset \xrightarrow{7} \emptyset$

,101: $\xrightarrow{start} q_1 \xrightarrow{,} \emptyset \xrightarrow{1} \emptyset \xrightarrow{0} \emptyset \xrightarrow{1} \emptyset$

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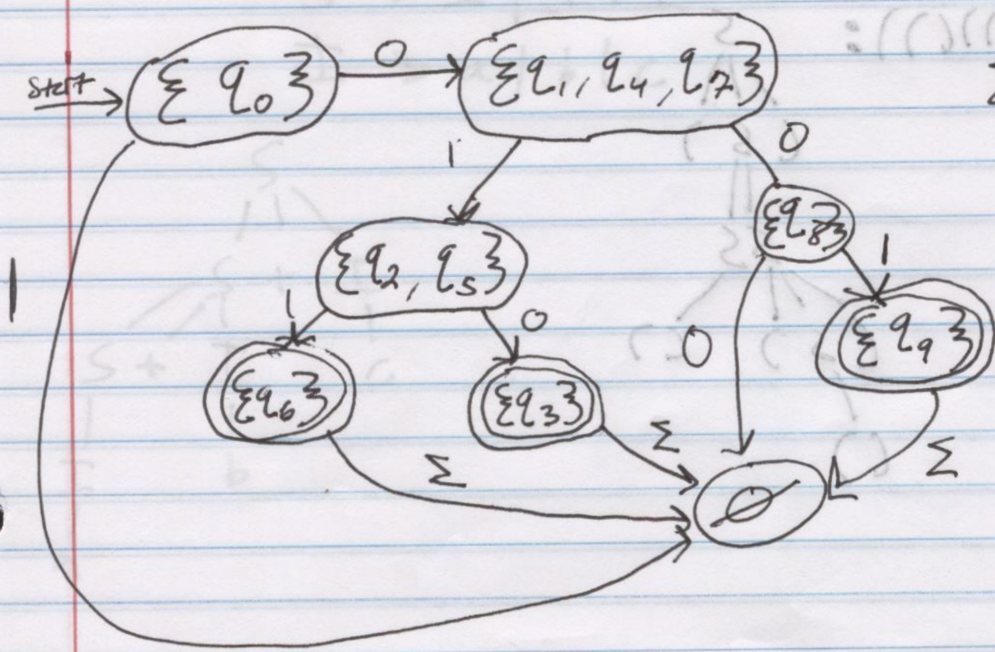
2. ~~This automata is non deterministic~~ because for each state there does not exist one transition for each possible letter of the given alphabet. For example, given character "0", q_0 goes to 3 different states.

	0	1
→ $\{q_0\}$	$\{q_1, q_4, q_7\}$	—
$\{q_1, q_4, q_7\}$	$\{q_8\}$	$\{q_2, q_5\}$
$\{q_8\}$	—	$\{q_9\}$
$\{q_2, q_5\}$	$\{q_3\}$	$\{q_6\}$
q_9^*	—	—
q_3^*	—	—
q_6^*	—	—



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

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Context Free Grammars

[redacted]

(3) $G = (\{S\}, \{\text{"("}, \text{")"}\}, P, S)$ $N = \{S\}$

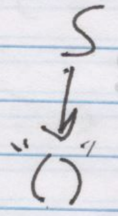
$T = \{\text{"("}, \text{")"}\}$

$S = S$

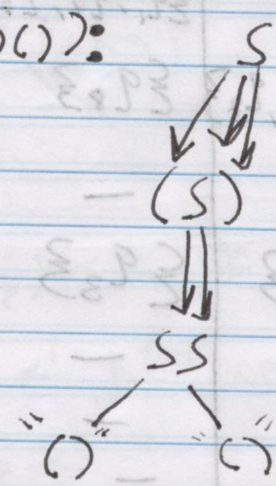
Where P is:

1. $S \rightarrow \text{"()"}$
2. $S \rightarrow (S)$
3. $S \rightarrow SS$

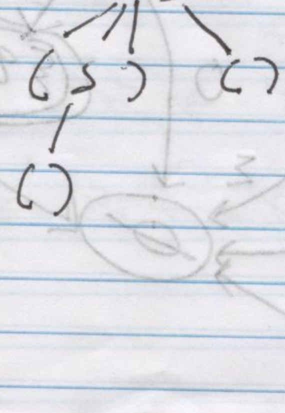
():



(()()):



((())()):



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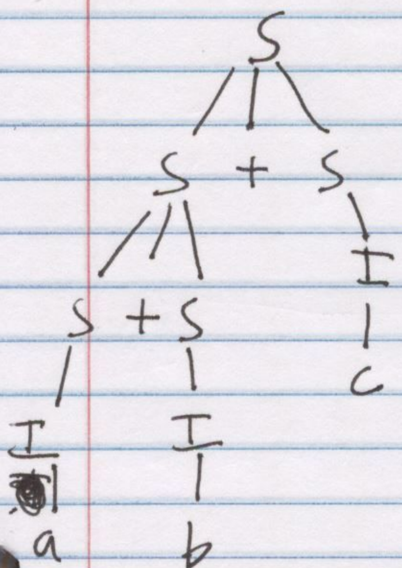
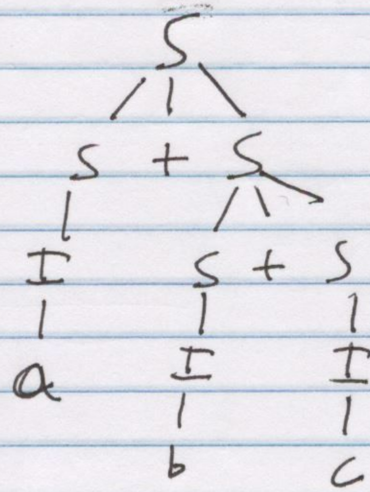
4) Parse trees for a+b+c:





To make the grammar unambiguous; Change the production Rules to:

$$S \rightarrow I \mid S+I$$
$$I \rightarrow a \mid b \mid c$$