CSCI 301 M6 Homework

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Collaboration statement: By submitting this assignment, I am attesting that this homework is in full compliance with the course's https://wwu.instructure.com/courses/1340003/pages/academic-dishonesty-guidelines Homework Collaboration Policy and with all the other relevant academic honesty policies of the course and university. I discussed this homework with no one and wrote this solution without input from anyone else.

1. (a) $V = \{q_1, q_2, q_3, q_4\}$.
   (b) $S = q1$.
   (c) R consists of rules:
   $q_1 \to aq_1|bq_2|cq_3$.
   $q_2 \to \varepsilon$.
   $q_3 \to cq_4$.
   $q_4 \to bq_2|\varepsilon$.
   (d) $\Sigma = \{a, b, c\}$.

2. (a) $V = \{S\}$.
   $\Sigma = \{0, 1\}$.
   R consists of rules:
   $S \to \varepsilon|0S1$.
   $S = S$.
   (b) $\Sigma = \{0, 1\}$.
   $\Gamma = \{\$, S\}$.
   $Q = \{q_0, q_1, q_2\}$.
   $\delta = \{$
   $q_0 0\$ \to q_0 R\$S$
   $q_0 0S \to q_0 RSS$
   $q_0 1\$ \to q_0 N\$$
   $q_0 1S \to q_1 R\varepsilon$
   $q_0 \square\$ \to q_0 N\varepsilon$
   $q_0 \square S \to q_0 NS$
   $q_1 0\$ \to q_1 N\$$
   $q_1 0S \to q_1 NS$
   $q_1 1\$ \to q_1 N\$$
   $q_1 1S \to q_1 R\varepsilon$
   $q_1 \square\$ \to q_1 N\varepsilon$
   $q_1 \square S \to q_1 NS\}$.

3. (a) $V = \{S\}$.
   $\Sigma = \{0, 1\}$.
   R consists of rules:
   $S \to \varepsilon|0S1$.
   $S = S$.

(b) $\Sigma = \{0, 1\}$.
$\Gamma = \{\$, S\}$.
$Q = \{q_0, q_1, q_2\}$.
$\delta = \{$
$q_0 1\$ \to q_0 N\$$
$q_0 1S \to q_1 R\varepsilon$
$q_0 \square\$ \to q_0 N\varepsilon$
$q_0 \square S \to q_0 NS$
$q_1 1\$ \to q_1 N\$$
$q_1 1S \to q_1 R\varepsilon$
$q_1 \square\$ \to q_1 N\varepsilon$
$q_1 \square S \to q_1 NS$
$q_0 1\$ \to q_0 N\$$
$q_0 1S \to q_1 R\varepsilon$
$q_0 \square\$ \to q_0 N\varepsilon$
$q_0 \square S \to q_0 NS\}$.

4. (a) $V = \{S\}$.
$\Sigma = \{0, 1\}$.
R consists of rules:
$S \to \varepsilon | 0S1$.
$S = S$.

(b) $\Sigma = \{0, 1\}$.
$\Gamma = \{\$, S\}$.
$Q = \{q, q'\}$.
$\delta = \{$
$q' 0\$ \to q' N\varepsilon$
$q' 0S \to q' R\varepsilon$
$q' 1\$ \to q' N\varepsilon$
$q' 1S \to q' R\varepsilon$
$q' \square\$ \to q' N\varepsilon$
$q' \square S \to q' NS\}$.
$q 0\$ \to qR\$S$
$q 0S \to qRSS$
$q 1\$ \to q' R\$$
$q 1\$ \to qR\$S$
$q 1S\$ \to q' RS$
$q 1S\$ \to qRRS$
$q \square\$ \to qN\$$
$q \square S \to qNS$
Input string possibly rejected.