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Worksheet 9

Question 1

Given: $q_0 A \rightarrow q_1 NCB$, for all $a \in \Sigma$

1.

CFG Rule	NDPDA equivalent transitions
$S \rightarrow AB$	$q_0 S \rightarrow q_1 NBA$ & $q_1 S \rightarrow q_1 NBA$
$A \rightarrow AB$	$q_0 S \rightarrow q_1 NBA$ & $q_1 S \rightarrow q_1 NBA$
$A \rightarrow CB$	$q_0 S \rightarrow q_1 NBC$ & $q_1 S \rightarrow q_1 NBC$
$B \rightarrow AB$	$q_0 S \rightarrow q_1 NBA$ & $q_1 S \rightarrow q_1 NBA$
$C \rightarrow AC$	$q_0 S \rightarrow q_1 NCA$ & $q_1 S \rightarrow q_1 NCA$

$q_a A \rightarrow q_1 R\epsilon$

2.

CFG Rule	NDPDA equivalent transitions
$A \rightarrow a$	$q_a A \rightarrow q_1 R\epsilon$
$B \rightarrow b$	$q_b B \rightarrow q_1 R\epsilon$
$C \rightarrow c$	$q_c C \rightarrow q_1 R\epsilon$

$q_1 \square \$ \rightarrow q_1 N\epsilon$

3.

CFG Rule	NDPDA equivalent
$S \rightarrow \epsilon$	$q_1 \square S \rightarrow q_1 N\epsilon$

4.

CFG	Equivalent NDPDA
$S \to \epsilon$	$q\square S \to qN\epsilon$
$S \to AB$	$q0S \to qNBA$ & $q1S \to qNBA$
$A \to AB$	$q0S \to qNBA$ & $q1S \to qNBA$
$A \to CB$	$q0S \to qNBC$ & $q1S \to qNBC$
$B \to AB$	$q0S \to qNBA$ & $q1S \to qNBA$
$C \to AC$	$q0S \to qNCA$ & $q1S \to qNCA$
$A \to a$	$qaA \to qR\epsilon$
$B \to b$	$qbB \to qR\epsilon$
$C \to c$	$qcC \to qR\epsilon$

Question 2

$q_0 0\$ \rightarrow q_0 R\$S$

$q_0 0S \rightarrow q_0 R\$SS$

$q_0 1\$ \rightarrow q_1 R\$S$

$q_0 1S \rightarrow q_1 R\$SS$

$q_0 \square\$ \rightarrow q_0 N\$$

$q_0 \square S \rightarrow q_0 NS$

$q_1 0\$ \rightarrow q_0 N\epsilon\$$

$q_1 0S \rightarrow q_0 NS$

$q_1 1\$ \rightarrow q_1 R\$S$

$q_1 1S \rightarrow q_1 R\$SS$

$q_1 \square\$ \rightarrow q_1 N\epsilon$

$q_1 \square S \rightarrow q_1 NS$