CS302 HW6

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Question 1

a) $S \rightarrow AE \mid EB \mid A \mid B \mid c$

$E \rightarrow aEb \mid ab$

The others A, B, C and E are same.

b) Unit pairs : (S,A) (S,B) (S,C)

$S \rightarrow AE \mid EB \mid aA \mid a \mid Bb \mid b \mid Cc$

Others; A, B, C, D and E remain same.

c) D is non-reachable

$S \rightarrow AE \mid EB \mid aA \mid a \mid Bb \mid b \mid Cc$

$A \rightarrow aA \mid a$

$B \rightarrow Bb \mid b$

$C \rightarrow Cc$

$E \rightarrow aEb \mid ab$

d) I need to eliminate (S,aA) (S,Bb) (S,Cc) (A,aA) (B,Bb) (C,Cc) (E,aEb)

$S \rightarrow AE \mid EB \mid G_aA \mid G_a \mid BG_b \mid G_b \mid CG_c$

$A \rightarrow G_aA \mid G_a$

$B \rightarrow BG_b \mid G_b$

$C \rightarrow CG_c$

$E \rightarrow G_aEG_b \mid G_aG_b$

$G_a \rightarrow a$

$G_b \rightarrow b$

$G_c \rightarrow c$

Replace $A \rightarrow B_1B_2 \ldots B_n$ for $n \geq 3$

$S \rightarrow AE \mid EB \mid G_aA \mid G_a \mid BG_b \mid G_b \mid CG_c$

$A \rightarrow G_aA \mid G_a$

$B \rightarrow BG_b \mid G_b$

$C \rightarrow CG_c$

$E \rightarrow G_aF \mid G_aG_b$

$F \rightarrow EG_b$

$G_a \rightarrow a$

$G_b \rightarrow b$

$G_c \rightarrow c$

Question 2

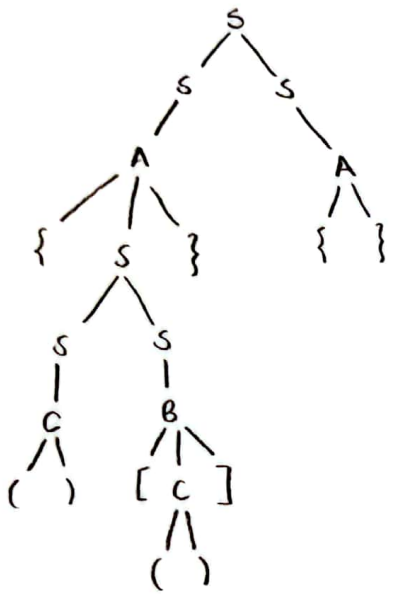
a) $S \rightarrow SS \mid A \mid B \mid C$

$A \rightarrow \{S\} \mid \{\}$

$B \rightarrow [B] \mid [C] \mid []$

$C \rightarrow (C) \mid ()$

b)



6.4.1.a)

The PDA mentioned in the question contains these 2 transitions:

$\delta(q_0, 0, Z_0) = \{(q_0, 0Z_0)\}$

$\delta(q_0, \varepsilon, Z_0) = \{(q_1, Z_0)\}$

> Given the top of the stack is Z_0 and initial states are the same, these transitions give 2 options which end up in 2 different end-states.

$\Rightarrow$ Non-deterministic

6.4.1.c)

The PDA mentioned in the question has these 3 transitions

$\delta(q, 1, X) = \{(q, XX)\}$

$\delta(q, 0, X) = \{(p, X)\}$

$\delta(q, \varepsilon, X) = \{(q, \varepsilon)\}$

> These have the same start state and the top of the stacks however given the input, it is possible to choose ε over 1 or 0, this creates non-determinance.

$\Rightarrow$ Non-deterministic