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Gradiance Online Accelerated Learning

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Based on Chapter 6 of HMU.

1. Consider the pushdown automaton with the following transition rules:

1. $\delta(q,0,Z_0) = \{(q,XZ_0)\}$
2. $\delta(q,0,X) = \{(q,XX)\}$
3. $\delta(q,1,X) = \{(q,X)\}$
4. $\delta(q,\varepsilon,X) = \{(p,\varepsilon)\}$
5. $\delta(p,\varepsilon,X) = \{(p,\varepsilon)\}$
6. $\delta(p,1,X) = \{(p,XX)\}$
7. $\delta(p,1,Z_0) = \{(p,\varepsilon)\}$

The start state is q. For which of the following inputs can the PDA first enter state p with the input empty and the stack containing XXZ_0 [i.e., the ID (p,ε,XXZ_0)]?

a) 0100110
b) 0011011
c) 101010
d) 1001101

Answer submitted: **b)**

You have answered the question correctly.

2. Here are the transitions of a deterministic pushdown automaton. The start state is q_0, and f is the accepting state.

State-Symbol	a	b	ε
q_0-Z_0	(q_1,AAZ_0)	(q_2,BZ_0)	(f,ε)
q_1-A	(q_1,AAA)	(q_1,ε)	-
q_1-Z_0	-	-	(q_0,Z_0)

q_2-B	(q_3,ε)	(q_2,BB)	-
q_2-Z_0	-	-	(q_0,Z_0)
q_3-B	-	-	(q_2,ε)
q_3-Z_0	-	-	(q_1,AZ_0)

Describe informally what this PDA does. Then, identify below, the one input string that takes the PDA into state q_3 (with any stack).

a) bbbaa

b) baba

c) babbbab

d) bababba

Answer submitted: **a)**

You have answered the question correctly.

3. Suppose one transition rule of some PDA P is $\delta(q,0,X) = \{(p,YZ), (r,XY)\}$. If we convert PDA P to an equivalent context-free grammar G in the manner described in Section 6.3.2 (p. 247), which of the following could be a production of G derived from this transition rule? You may assume *s* and *t* are states of P, as well as *p, q*, and *r*.

a) [qXt] → 0[pYr][qZt]

b) [qXt] → 0[rXr][rYt]

c) [qXt] → 0[rXr][qYt]

d) [qXt] → [rXr][rYt]

Answer submitted: **b)**

You have answered the question correctly.

4. If we convert the context-free grammar G:

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S → AS | A
A → 0A | 1B | 1
B → 0B | 0
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to a pushdown automaton that accepts L(G) by empty stack, using the construction of Section 6.3.1, which of the following would be a rule of the PDA?

a) $\delta(q,\varepsilon,B) = \{(q,0B)\}$

b) $\delta(q,\varepsilon,S) = \{(q,SA), (q,A)\}$

c) $\delta(q,\varepsilon,A) = \{(q,0A)\}$

d) $\delta(q,\varepsilon,S) = \{(q,AS), (q,A)\}$

Answer submitted: **d)**

You have answered the question correctly.

5. Here are the transitions of a determininstic pushdown automaton. The start state is q_0, and *f* is the accepting state.

State-Symbol	a	b	ε
q_0-Z_0	(q_1,AAZ_0)	(q_2,BZ_0)	(f,ε)
q_1-A	(q_1,AAA)	(q_1,ε)	-
q_1-Z_0	-	-	(q_0,Z_0)
q_2-B	(q_3,ε)	(q_2,BB)	-
q_2-Z_0	-	-	(q_0,Z_0)
q_3-B	-	-	(q_2,ε)
q_3-Z_0	-	-	(q_1,AZ_0)

Describe informally what this PDA does. Then, identify below the one input string that the PDA accepts.

a) abbbab

b) baabbba

c) bbbaabbb

d) bbaabab

Answer submitted: **a)**

You have answered the question correctly.

6. Consider the pushdown automaton with the following transition rules:

1. $\delta(q,0,Z_0) = \{(q,XZ_0)\}$
2. $\delta(q,0,X) = \{(q,XX)\}$
3. $\delta(q,1,X) = \{(q,X)\}$
4. $\delta(q,\varepsilon,X) = \{(p,\varepsilon)\}$
5. $\delta(p,\varepsilon,X) = \{(p,\varepsilon)\}$
6. $\delta(p,1,X) = \{(p,XX)\}$
7. $\delta(p,1,Z_0) = \{(p,\varepsilon)\}$

From the ID $(p,1101,XXZ_0)$, which of the following ID's can NOT be reached?

a) $(p,1101,XZ_0)$

b) $(p,101,\varepsilon)$

c) $(p,01,XXXXZ_0)$

d) $(p,101,XXXXZ_0)$

Answer submitted: **d)**

You have answered the question correctly.