



Zayd

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You obtained a score of 18.0 points, out of a possible 18.0 points.

You have answered all the questions correctly.

Congratulations, you have achieved the maximum possible score.

Submission number: 71226
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Help

Number of questions: 6
Positive points per question: 3.0
Negative points per question: 1.0
Your score: 18

Based on Chapter 6 of HMU.

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

This NDPA accepts any string with twice as many b's as a's.

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.

- bbbaabbb
- bbaa
- bababbaa
- babbba

Answer submitted: **d)**

You have answered the question correctly.

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

$$\begin{aligned} S &\rightarrow AS \mid A \\ A &\rightarrow 0A \mid 1B \mid 1 \\ B &\rightarrow 0B \mid 0 \end{aligned}$$

Similar to pushdown automata in class with mostly epsilon transitions and terminal symbols pushed onto stack and only popped off by themselves as input string.

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?

- $\delta(q, \epsilon, B) = \{(q, 0B)\}$
- $\delta(q, 0, B) = \{(q, B), (q, \epsilon)\}$
- $\delta(q, \epsilon, S) = \{(q, AS)\}$
- $\delta(q, 0, 0) = \{(q, \epsilon)\}$

Answer submitted: **d)**

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 .

- $[qXq] \rightarrow 0[rXr][rYq]$
- $[qXq] \rightarrow 0[rXr][sYq]$
- $[qXq] \rightarrow [rXr][rYq]$
- $[qXq] \rightarrow 0[qYr][rZp]$

Answer submitted: **a)**

You have answered the question correctly.

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

- $\delta(q, 0, Z_0) = \{(q, XXZ_0)\}$
- $\delta(q, 0, X) = \{(q, XX)\}$
- $\delta(q, 1, X) = \{(q, X)\}$
- $\delta(q, \epsilon, X) = \{(p, \epsilon)\}$
- $\delta(p, \epsilon, X) = \{(p, \epsilon)\}$
- $\delta(p, 1, X) = \{(p, XX)\}$
- $\delta(p, 1, Z_0) = \{(p, \epsilon)\}$

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)]?

- 0111011
- 011011011
- 011001101

Variable in production on the outside (e.g. 0). Start in state of production then iterate through states to get to matching final state. Second state of first bracketed set must match first state of second bracketed set.

Answer should begin with 0 and have only three 0's in the string.

c) 011001101

d) 111001

Answer submitted: **b)**

You have answered the question correctly.

5. 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. $\delta(q, \epsilon, X) = \{(p, \epsilon)\}$
5. $\delta(p, \epsilon, X) = \{(p, \epsilon)\}$
6. $\delta(p, 1, X) = \{(p, XX)\}$
7. $\delta(p, 1, Z_0) = \{(p, \epsilon)\}$

Can ignore the q state productions.

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

- a) $(p, 01, XXXZ_0)$
- b) $(p, 101, Z_0)$
- c) $(p, 01, XXXXXZ_0)$
- d) $(p, 101, XXXZ_0)$

Answer submitted: **c)**

You have answered the question correctly.

6. 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) baabba
- b) abbba
- c) babbabaa
- d) baba

Answer submitted: **b)**

You have answered the question correctly.

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