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Zayd

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Help

Homework Assignment Submitted Successfully.

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
Submission certificate:	HH147445
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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 determininstic 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.

a) bbbaabbb

b) bbaa

c) bababbaa

d) babbba

Answer submitted: **d)**

You have answered the question correctly.

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

```
S → AS | A
A → 0A | 1B | 1
B → 0B | 0
```

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

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

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

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

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*.

a) $[qXq] \rightarrow 0[rXr][rYq]$

b) $[qXq] \rightarrow 0[rXr][sYq]$

c) $[qXq] \rightarrow [rXr][rYq]$

d) $[qXq] \rightarrow 0[qYr][rZp]$

Variable in production (e.g. 0) goes on the outside of the square brackets on the right side of the production. Start in state of production (e.g. p or r) then iterate through states to get to matching final state as shown in the left side of the production right before the square bracket. On the right side of the production, second state of first bracketed set must match first state of second bracketed set.

Answer submitted: **a)**

You have answered the question correctly.

4. 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. $\delta(p,1,Z_0) = \{(p,\varepsilon)\}$

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

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) 0111011

b) 011011011

c) 011001101

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

Can ignore the q state productions. ID in this question stands for Instantaneous Description.

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)

The answer to this question has more than twice as many b's than a's when one of the a's is called. The string must be fully consumed. As such, the string must end in "a" or it can be instantly eliminated.

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.