Feedback — Quiz #2

Help

You submitted this quiz on **Mon 14 Apr 2014 11:41 PM PDT**. You got a score of **12.00** out of **12.00**.

Question 1

How many strings does the following grammar generate?

$A \rightarrow BB$

$B \rightarrow CC$

$C \rightarrow 1 \mid 2$

Your Answer		Score	Explanation
2			
4			
15			
8			
7			
16	✔	1.00	
Total		1.00 / 1.00	

Question Explanation

The grammar will generate strings of length 4, each position can be 1 or 2. We have 2^4=16 strings in total.

Question 2

How many strings does the following grammar generate?

$A \rightarrow BB$

$B \rightarrow CC$

$C \rightarrow 1 \mid 2 \mid \epsilon$

Your Answer		Score	Explanation
15			
32			
64			
63			
12			
31	✔	1.00	
11			
16			
Total		1.00 / 1.00	

Question Explanation

The grammar will generate 16 strings of length 4, 8 strings of length 3, 4 strings of length 2, 2 strings of length 1 and one empty string. We have 16+8+4+2+1=31 in total.

Question 3

Which of the following grammar(s) produce regular languages?

[Choose all that apply]

Your Answer		Score	Explanation
$A \rightarrow (A) \mid \epsilon$	✔	0.12	
$A \rightarrow Aa \mid b$	✔	0.12	The grammar generates regular language of ba*.
$A \rightarrow AAaab \mid aab$	✔	0.12	The grammar generates regular language of (aabaab)*aab.

☑ $A \rightarrow AAaab \mid \epsilon$	✔	0.12	The grammar generates regular language of (aab)*.
☑ $A \rightarrow aA \mid b$	✔	0.12	The grammar generates regular language of a*b.
☑ $A \rightarrow (A(\mid \epsilon$	✔	0.12	
☑ $A \rightarrow (B) \mid (BB)$ $B \rightarrow (CC) \mid (CCC)$ $C \rightarrow (DDD)$ $D \rightarrow ()$	✔	0.12	
☐ $A \rightarrow aaAb \mid \epsilon$	✔	0.12	
Total		1.00 / 1.00	

Question 4

Considering the following grammar:

$S \rightarrow A$

$A \rightarrow B \mid C$

$B \rightarrow (C)$

$C \rightarrow B + C \mid D$

$D \rightarrow 1 \mid 0$

Adding which of the following will cause the grammar to be left-recursive?

[Choose all that apply]

Your Answer		Score	Explanation
☑ $D \rightarrow A$	✔	0.17	$D \rightarrow A$, $A \rightarrow C$,and $C \rightarrow D$ together cause the grammar to be left-recursive.
☐ $D \rightarrow B$	✔	0.17	
☑ $C \rightarrow C + B$	✔	0.17	$C \rightarrow C + B$ itself causes the grammar to be left-recursive.
☐ $C \rightarrow 1C$	✔	0.17	
☑ $B \rightarrow C$	✔	0.17	$B \rightarrow C$ and $C \rightarrow B + C$ together cause the grammar to

be left-recursive.

☐ $A \rightarrow D$	✔	0.17
Total		1.00 / 1.00

Question 5

Which of the following grammars correctly removes left-recursion from:

$S \rightarrow A\alpha \mid \delta$

$A \rightarrow S\beta$

[Choose all that apply]

Your Answer		Score	Explanation
☐ $S \rightarrow A\alpha \mid \delta$ $A \rightarrow \delta\beta \mid A\alpha\beta$	✔	0.25	This grammar is still left-recursive.
☑ $S \rightarrow \delta S'$ $S' \rightarrow AS' \mid \epsilon$ $A \rightarrow \beta\alpha$	✔	0.25	
☐ $S \rightarrow \delta A\alpha \mid \delta$ $A \rightarrow A'A \mid \epsilon$ $A' \rightarrow \alpha\beta$	✔	0.25	This grammar is not equivalent to the grammar given in the question. This grammar cannot produce string $\delta\beta\alpha$, which can be produced by the grammar in the question.
☑ $S \rightarrow A\alpha \mid \delta$ $A \rightarrow \delta\beta A'$ $A' \rightarrow \alpha\beta A' \mid \epsilon$	✔	0.25	
Total		1.00 / 1.00	

Question 6

Consider the following grammar:

$E \rightarrow E * E \mid E + E \mid (E) \mid int$

How many unique parse trees are there for the string $5 * 3 + (2 * 7) + 4$?

Your Answer		Score	Explanation
1			
5	✔	1.00	
4			
8			
2			
7			
Total		1.00 / 1.00	

Question Explanation

Denote the parse tree like following:
1. {{5 * 3} + (2 * 7) } + 4
2. {5 * 3} + {(2 * 7) + 4}
3. 5 * { 3 + {(2 * 7) + 4}}
4. {5 *{3 + (2 * 7)}} + 4
5. 5 * {{3 + (2 * 7)} + 4}

Question 7

Using the grammar and string from the previous question (Question 6), which of the following rules are necessary to produce a unique parse tree for the string $5 * 3 + (2 * 7) + 4$?
[Choose all that apply]

Your Answer		Score	Explanation
☑ multiplication binds more tightly than addition	✔	0.25	
☐ parentheses bind more tightly than multiplication	✔	0.25	
☐ multiplication associates to the left	✔	0.25	
☑ addition associates to the left	✔	0.25	

Total	1.00 / 1.00

Question 8

[Choose all that apply]

Your Answer		Score	Explanation
☑ The language "$0^n 1^n$, where n > 0 is an integer" is context-free but not regular.	✔	0.20	
☐ The language "0^{n^2}, where n > 0 is an integer" is regular.	✔	0.20	The language "0^{n^2}, where n > 0 is an integer" is not regular.
☑ The language "0^{n^2}, where n > 0 is an integer" is neither context-free nor regular..	✔	0.20	
☑ The language "strings with an even number of 0's" is both regular and context-free.	✔	0.20	
☐ The language "$0^n 1^n 2^n$, where n > 0 is an integer" is context-free but not regular.	✔	0.20	The language "$0^n 1^n 2^n$, where n > 0 is an integer" is neither context-free nor regular.
Total		1.00 / 1.00	

Question 9

Consider following 4 grammars:

G1. $S \rightarrow aSb \mid Sb \mid b$

G2. $S \rightarrow Sa \mid Sb \mid c$

G3. $S \rightarrow SaS \mid \epsilon$

G4. $S \rightarrow bT$

$T \rightarrow aT \mid \epsilon$

Let n = the number of grammars where there exists a string that has at least two different left-most derivations;

m = the number of grammars where for any string, we only have one parse tree;

k = the number of grammars that can be used with a recursive descent parser

Choose the correct value for n,m and k.

Your Answer		Score	Explanation
n =1; m = 2; k = 1			
n = 2; m = 2; k = 2			
n =1; m = 1; k = 0			
n = 1; m = 1; k = 1			
n = 2; m = 2; k = 1	✔	1.00	
Total		1.00 / 1.00	

Question Explanation

n is the number of ambiguous grammar. G1 and G3 are ambiguous. So n=2.
m is the number of grammars that are not ambiguous. G2 and G4 are not ambiguous. So m=2.
k is the number of grammars that are not left-recursive. G4 is not left-recusive. So k =1.

Question 10

How many distinct strings and parse trees can be generated by the following grammar?

$S \rightarrow A1 \mid 1B$

$A \rightarrow 10 \mid C \mid \epsilon$

$B \rightarrow C1 \mid \epsilon$

$C \rightarrow 0 \mid 1$

Your Answer		Score	Explanation
5 strings, 7 parse trees	✔	1.00	
5 strings, 6 parse trees			

4 strings, 6 parse trees	
6 strings, 7 parse trees	
Total	1.00 / 1.00

Question Explanation

The grammar can generate string:
"1" with 2 parse trees, "11" with 1 parse tree, "111" with 1 parse tree, "01" with 1 parse tree, "101" with 2 parse trees.

Question 11

Which of the following grammar(s) are unambiguous and recognize the same grammar as:

$E \rightarrow E + E \mid E - E \mid E * E \mid E/E \mid int$

[Choose all that apply]

Your Answer		Score	Explanation
$E \rightarrow int + E \mid int - E \mid int * E \mid int/E \mid int$	✔	0.20	
$E \rightarrow int + E' \mid int - E' \mid int + E \mid int - E$ $E' \rightarrow int * E' \mid int/E' \mid int$	✔	0.20	This grammar is not equivalent to the grammar given in the problem. For example, it cannot generate "int * int".
$E \rightarrow E + int \mid E - int \mid E * int \mid E/int \mid int$	✔	0.20	
$E \rightarrow E' + E \mid E' - E \mid E'$ $E' \rightarrow int * E' \mid int/E' \mid int$	✔	0.20	
$E \rightarrow int + E \mid E - int \mid int * E \mid E/int \mid int$	✔	0.20	This grammar is not equivalent to the grammar given in the problem. For example, it cannot generate "int - int * int".

Total	1.00 / 1.00

Question 12

Let T_n be the string 0^n1, to be matched with a recursive descent parser using the following grammar:

S -> A | B | 0S
A -> 0A | 0
B -> 1

Is the number of token comparisons needed to (successfully) match T_n:

Your Answer		Score	Explanation
◉ $O(n^2)$	✔	1.00	
○ $O(n)$			
○ $O(2^n)$			
○ $O(1)$			
○ $O(n^3)$			
Total		1.00 / 1.00	

Question Explanation

The parser needs to choose S->0S for n times to match the n 0's in T_n and S->B->1 to match the last 1 in T_n.
To match each 0 and choose S->0S, the parser needs $O(n)$ comparisons.
To match 1 and choose S->B, B->1, the parser needs $O(n)$ comparisons.
In total, to match T_n, the parser needs $O(n*n+n)$=$O(n^2)$ comparisons.