Quiz: Context Free Grammar / Context Free Language

- Due Apr 20 at 11:59pm
- Points 92
- Questions 8
- Available Apr 14 at 12am - Apr 27 at 11:59pm
- Time Limit None
- Allowed Attempts 2

This quiz was locked Apr 27 at 11:59pm.

Attempt History

	Attempt	Time	Score
KEPT	Attempt 2	30 minutes	92 out of 92
LATEST	Attempt 2	30 minutes	92 out of 92
	Attempt 1	22 minutes	82 out of 92

ⓘ Correct answers are no longer available.

Score for this attempt: 92 out of 92
Submitted Apr 20 at 11:58pm
This attempt took 30 minutes.

Question 1
16 / 16 pts

Assume we want to remove all "null productions" from the following Context Free Grammar:

G = (V,T,S,P) where V={S,a,b} , T={0,1} , P={S→ab|S, a→0a|ε, b→1|a}

First we remove the null production: a→ε. After removing this production rule out of P, the new set of production rule will be:

{S→ab| b |S, a→0a| 0 , b→1|a| ε }

Now we remove the next null production rule: b →ε. After removing this production rule, the new set of production rule will be:

{S→ab| a |b|ε|S , a→0a|0, b→1|a}

Now we remove the next null production rule: S →ε. After removing this production rule, the new set of production rule will be:

{S→ab|a| b , a→ 0a |0, b→1|a}

Answer 1:
b
Answer 2:
0
Answer 3:
ε
Answer 4:
b
Answer 5:
a
Answer 6:
S
Answer 7:
b
Answer 8:
0a

Question 2
10 / 10 pts

Which one(s) of the following Context Free Grammars would be in the form of Greibach Normal Form?

- [ ] G=({S,A,B}, {a,b}, S, {S→BB|b, A→a|b|SS, B→a|SA})
- [ ] G=({S,A,B}, {a,b}, S, {S→aA|b, A→a|b|bABSS, B→a|SA})

- [x] G=({S,a,b}, {0,1}, S, {S→0ab|1, a→0|1bSS, b→0|0Sa})
- [ ] G=({S,a,b}, {0,1}, S, {S→0ab|1, a→0|bSS, b→0|0S})

Question 3
21 / 21 pts

Assume that we would like to simplify the following Context Free Grammar, G:

G = (V,T,S,P) where V={S,a,b,c,d} is the set of non-terminal symbols, T={0,1,2} is the set of terminal symbols, S is the start symbol and P={S→ac|d, a→0, c→1|bc, d→0b} is the set of the production rules.

In our first step, we start by the terminal symbol set, T, and we find set W1 whose members yield to W0=T, then we find W2 whose members yield to W1, etc.

At the end of this step, our grammar will be simplified as following:

The terminal set is {0,1,2}, and the non-terminal set is {S,a,c} , the start symbol is S, and the set of production rules is

{S→ ac , a→0, c→ 1 }

In the next step, we begin by the start symbol, S: Z0=S, then we find the set Z1 whose members are yielded from Z0, then we find Z2 whose members are yielded from Z1, etc.

At the end of this step, our grammar will be simplified as following:

The terminal set is {0,1} , and the non-terminal set is {S,a,c} , the start symbol is S, and the set of production rules is

{S→ ac , a→0, c→ 1 }.

Answer 1:
{S,a,c}
Answer 2:
ac
Answer 3:

1

Answer 4:

{0,1}

Answer 5:

{S,a,c}

Answer 6:

ac

Answer 7:

1

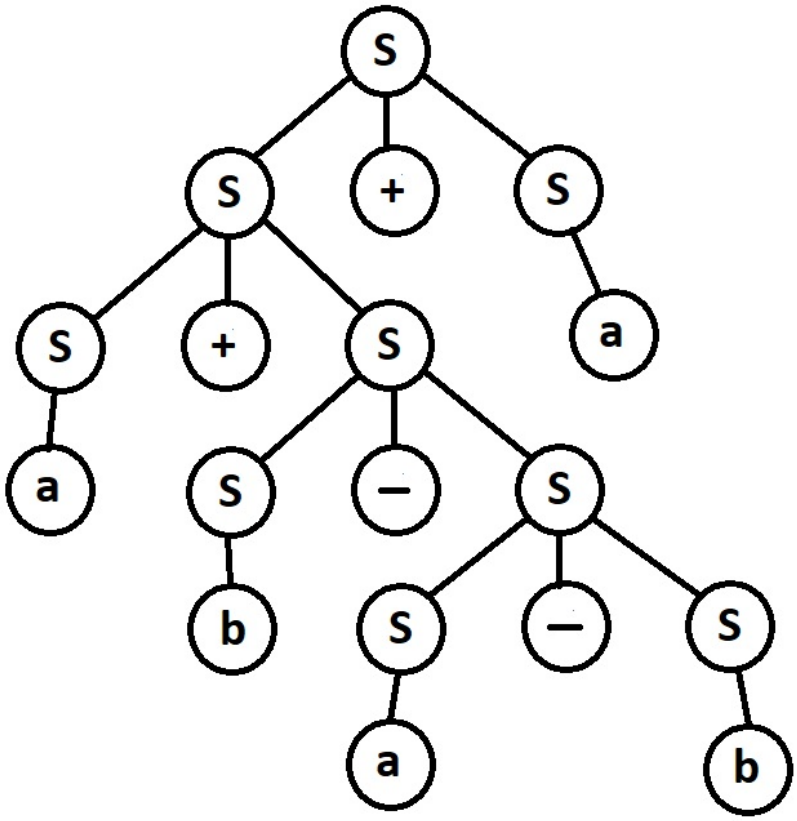
Question 4

10 / 10 pts

For this Context Free Grammar:

G = ({S} , {a+b, a-b, +, –} , S , {S→S+S | S–S | a | b})

This related Parse (Derivation) Tree is given:



The string associated with this parse tree is a+b-a-b+a .

Since there are muliple parse left parse tree to create this string, therefore G is an ambiguous gramma

Answer 1:
a+b-a-b+a
Answer 2:
ambiguous grammar

Question 5
5 / 5 pts

If there are more than one left parse tree (derivation tree) for a given string in a language generated by the Context Free Grammar, G, then the grammar G is the [ans] grammar.

ambiguous

Question 6
10 / 10 pts

Assume that G is a Context Free Grammar as the 4-tuple (V,T,S,P) where V={S,A,B} set of non-terminal symbols, T={a,b} set of terminal symbols, and S is the start symbol, and P is the set of the production rules.

Select the correct statement(s).

- [ ] P is defined as $\{X \rightarrow Y : \text{such that } X \in V, Y \in (V \cup T)^{+}\}$
- [x] P is defined as $\{X \rightarrow Y : \text{such that } X \in V, Y \in (V \cup T)^{*}\}$
- [ ] $\{S \rightarrow \varepsilon\}$ can not be a subset of P.
- [x] $\{S \rightarrow Aa|AB|bA\}$ can be a subset of P.

Question 7
10 / 10 pts

Select the Context Free Grammar below that is in the form of Chomsky Normal Form.

- [ ] G=({S,a,b}, {0,1}, S, {S→0b|1a, a→0|0S|1aa, b→1|1S|0bb})
- [x] G=({S,a,b}, {0,1}, S, {S→ab|1, a→0|1|Sa, b→1|bS})
- [ ] G=({S,A,B}, {a,b}, S, {S→AB|bA, A→a|b|SB, B→a|SB})
- [x] G=({S,A,B}, {a,b}, S, {S→BB|b, A→a|b|SS, B→a|SA})

Question 8
10 / 10 pts

The Context Free Grammar below is given:

G=({S,a,b}, {0,1}, S, {S→0b|1a, a→0|0S|1aa|ε, b→1|1S|0bb})

Which string(s) could belong to the language generated by this grammar?

- [x] 101110111
- [ ] 10010100
- [x] 0100101110
- [ ] 0000100001

Quiz Score: 92 out of 92