## Pop Quiz #13 (CYK parsing)

**Due** Mar 25 at 11:59pm

Points 11

**Questions** 8

Available after Mar 25 at 1:30pm

Time Limit None

**Allowed Attempts** 2

Take the Quiz Again

## **Attempt History**

	Attempt	Time	Score
LATEST	Attempt 1	3 minutes	10 out of 11

(!) Correct answers will be available on Mar 26 at 12am.

Score for this attempt: 10 out of 11

Submitted Mar 25 at 2:50pm This attempt took 3 minutes.

## Question 1

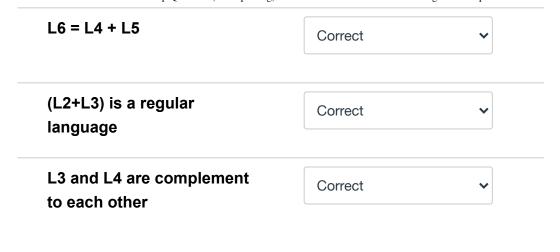
1 / 1 pts

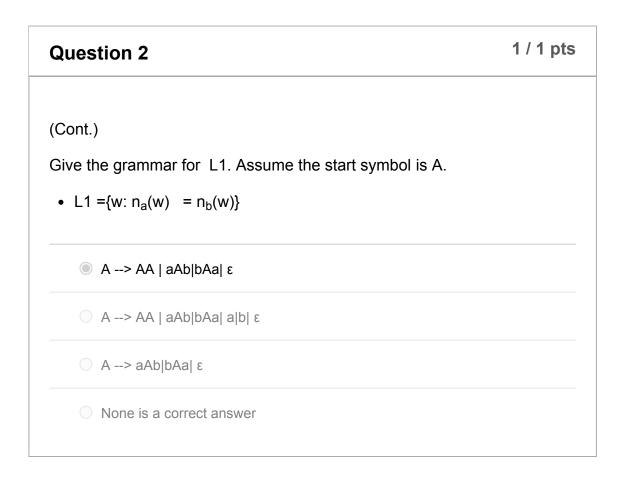
Consider the following languages over  $\Sigma = \{a, b\}$  with the notations below

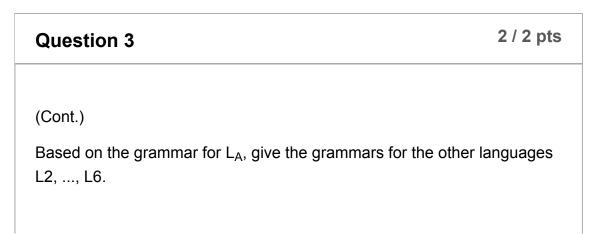
- n<sub>a</sub>(w): number of a's in string w
- n<sub>b</sub>(w): number of b's in string w
- L1 ={w:  $n_a(w) = n_b(w)$ }
- L2 ={w:  $n_a(w) >= n_b(w)$ }
- L3=  $\{w: n_a(w) \le n_b(w)\}$
- L4 = {w:  $n_a(w) > n_b(w)$ }
- L5 =  $\{w: n_a(w) < n_b(w)\}$
- L6 = {w:  $n_a(w) \neq n_b(w)$ }

L1 and L6 are complement to each other

Correct







Assume that A,B,C,D,E,F are the start symbols of the grammars for each of the languages. In particular, A is the start symbol of the grammar for  $L_{A_{\cdot}}$ 

Judge if the given grammar is correct or not

The grammar for L2: B> BB   A   a	Correct	<b>~</b>
The grammar for L3: C>	Correct	•
The grammar for L4: D>BaB	Correct	•
The grammar for L5: E>	Correct	•
The grammar for L6: F> D   E	Correct	•

Question 4 2 / 2 pts

Indicate the correctness of the given grammar for the following languages over  $\Sigma = \{a, b\}$ .

Assume that A,B,C,D,E,F are the start symbols of the grammars for each of the languages.

- L1 ={ $a^nb^n$  :  $n \ge 0$ }
- L2 ={ $a^m b^n$  : m,  $n \ge 0$ , m >= n}

## 

- n<sub>a</sub>(w): number of a's in string w
- $n_b(w)$ : number of b's in string w

- A ={ $a^n b^n : n \ge 0$ }
- $A' = \Sigma^* A =$ The complement of A
- B ={ $a^m b^n$ : m,  $n \ge 0$ , m  $\ne n$ }
- C = { w: w contains ba}
- D = {w:  $n_a(w) \neq n_b(w)$ }

Choose the correct statements about A'.

- A' = B + C
- A' = B
- None is a correct answer

Question 6 1 / 1 pts

To convert a context-free grammar G (which doesn't produce  $\lambda$ ) to CNF, we must remove

- Nullable variables (except the start symbol)
- Unit productions
- Useless variables
- None is a correct answer

3/25/2021

**Partial** 

Question 7 1 / 2 pts

**CYK Parser** 

Consider the table that uses the CYK parsing algorithm to determine if string w=aabbb is in L(G) for the gramma G listed on the top of the table.

- Complete the table by giving the values for the unknowns X,Y, and Z.
  - Fill in the names of variable S,A or B
  - o If the answer has multiple variables,
    - fill in the answers in the format of X,X,X, ..., X in the **string** order.

- (y/n) The string w=aabbb is in L(G) if and only if Z in the table contains the start symbol S.
  - Answer = y (fill in either y or n)

Grammar G: S>AB, A>BB a, B>AB b					
Use CYK to determine if w=aabbb in L(G)					
w =1	а	а	b	b	b
F(w)	{A}	{A}	{B}	{B}	{B}
w =2	aa	ab	bb	bb	
F(w)	{}	{S,B}	{A}	{A}	
w =3	aab	abb	bbb		
F(w)	{S,B}	{A}	{S,B}		
w =4	aabb	abbb			
F(w)	{X}	{Y}			

w =5	aabbb				
F(w)	{Z}				
F(w) = set of variables that produce w					

Answer 1:			
Α			
Answer 2:			
BS			
Answer 3:			
BS			
Answer 4:			
у			

Question 8	1 / 1 pts
(	
(cont.) CYK Parser	
Give the time complexity of the CYK parser. Assume that N is to of the string.	he length
O(N)	
○ O(N^2)	
O(N^3)	
O(N log N)	

Quiz Score: 10 out of 11