CSC 135 Section 5 (Friday)

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Context free Grammar assignment:

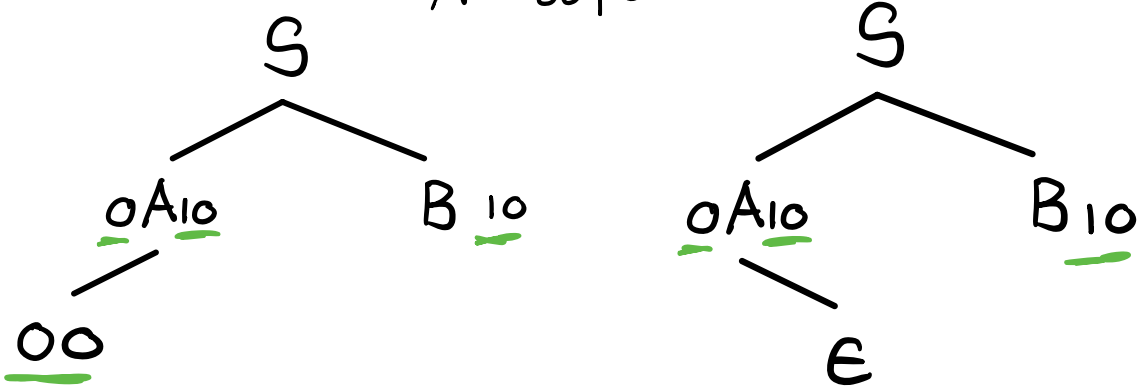
1. Show that the following CFG is ambiguous by finding an example of a string having two different leftmost derivation: S → 0A10 |B10, B → A0 |B1, A → 00|€.
2. Create a PDA for the language L = {$a^i b^j c^k$ I, j, k >=0 and i= j or i= k}
3. Create the context free grammar for all the strings over {a,b} with at most two a's any where in the string.
4. Consider the grammar E→ E + T | T, T → T * F |F, F → € |a. give the parse tree (left most or right most) for the expressions:
   a. a + a + a
   b. ((a))
5. Create the context free grammar for the following languages over {a,b}
   a. {W | w contains at least 3 ones anywhere in the string}
   b. {W| The set of all the strings with the number of a's more than the number of b's.
6. Convert the following CFG to its CNF: A → BAB |B | €, B → 00 | €
7. Create the PDA for the following languages
   a. A = {$a^m b^n c^n$ | m,n >=0}
   b. {$a^n b^n c^m$ |m,n >=0}

√ 1. Show that the following CFG is ambiguous by finding an example of a string having two different leftmost derivation: S → 0A10 |B10, B → A0 |B1, A → 00|€.

S → 0A10 | B10

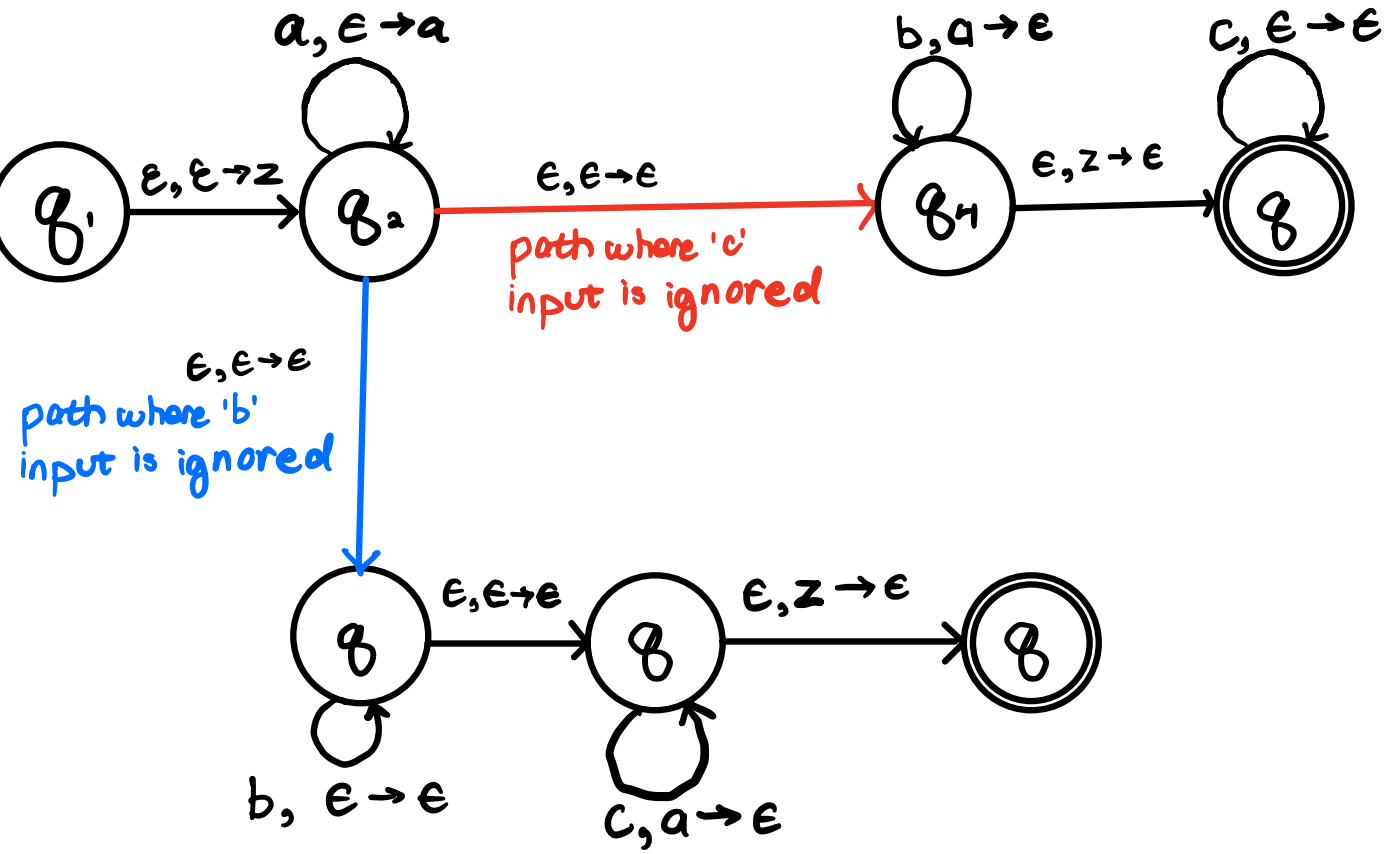
B → A0 | B1

A → 00 | €



0001010 ≠ 01010

2. Create a PDA for the language L = {$a^i b^j c^k$ I, j, k >=0 and i= j or i= k}



3. Create the context free grammar for all the strings over {a,b} with at most two a's any where in the string.

S = BABABB

B = bB | ε

A = a | ε

4. Consider the grammar E→ E + T | T, T → T * F |F, F → € |a. give the parse tree (left most or right most) for the expressions:

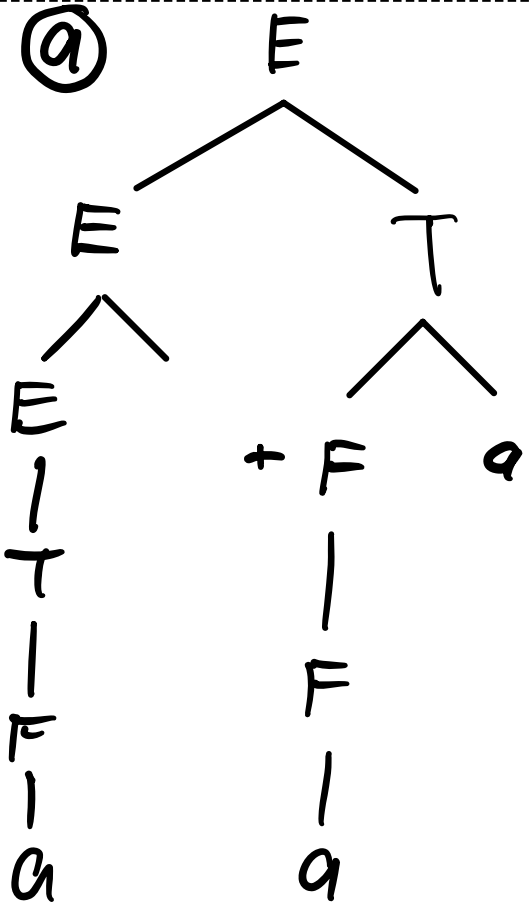
   a. a + a + a
   b. ((a))

$$E \rightarrow E + T \mid T$$

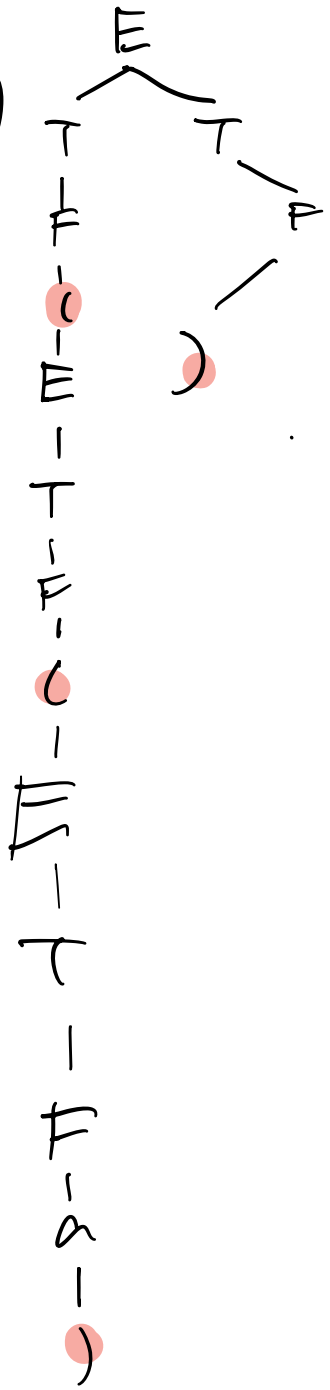
$$T \rightarrow T * F \mid F$$

$$F \rightarrow \epsilon \mid a$$

(a)



(b)



5. Create the context free grammar for the following languages over {a,b}
   a. {W | w contains at least 3 ones anywhere in the string}
   b. {W| The set of all the strings with the number of a's more than the number of b's.

a) $S = BaBaBaBA$

$B = bB \mid \epsilon$

$A = aA \mid \epsilon$

b) $S = \epsilon \mid XaX$

$X = \epsilon \mid aX \mid Xa \mid aXb \mid bXa$

6. Convert the following CFG to its CNF: A → BAB |B | €, B → 00 | €

$A \rightarrow BAB \mid B \mid \epsilon$

$B \rightarrow 00 \mid \epsilon$

Remove ϵ from $A \rightarrow \epsilon$:

$A \rightarrow BAB \mid BA \mid AB \mid A \mid B$

Repeat for $B \rightarrow \epsilon$

$B \rightarrow 00$

New production: C & R

$C \rightarrow BA$

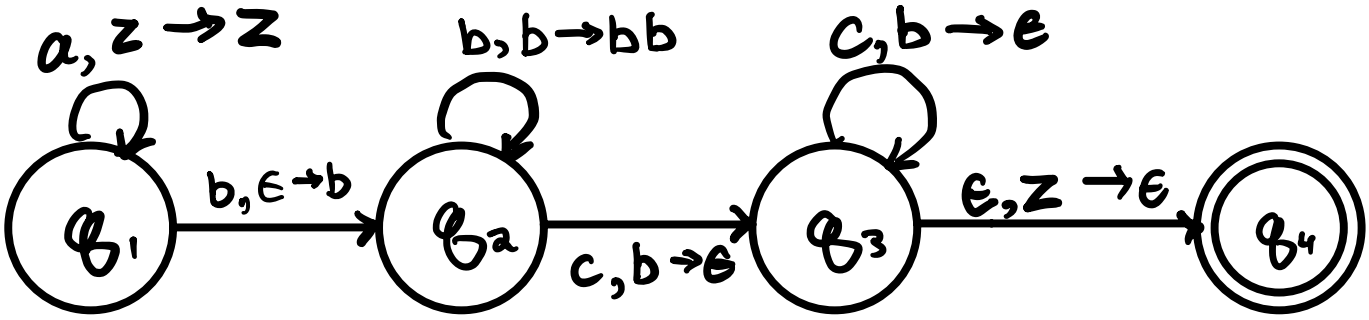
$A \rightarrow CB \mid BA \mid AB$

$R \rightarrow 0$

$B \rightarrow RR$

7. Create the PDA for the following languages
   a. $A = \{a^m b^n c^n \mid m,n >= 0\}$
   b. $\{a^n b^n c^m \mid m,n >= 0\}$

a)



b)