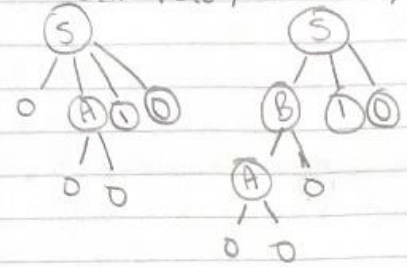
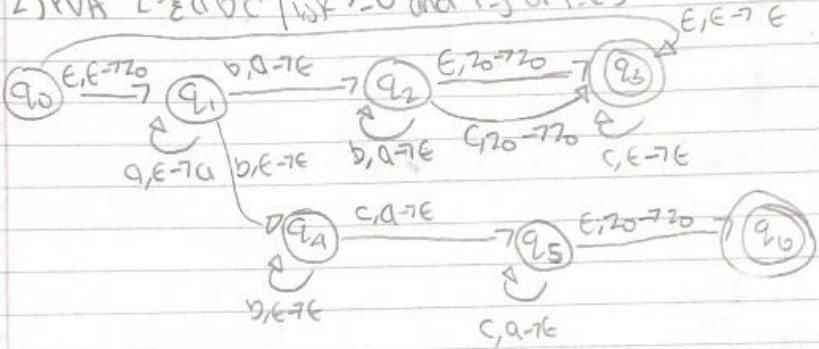
CFG ASSIGNMENT

1) Show CFG is ambiguous by finding an example of string having 2 different leftmost derivation

$S \to 0A10 \mid B0$, $B \to A0$, $A \to 00 \mid \epsilon$



2) PDA $L = \{a^i b^j c^k \mid i,j,k \geq 0 \text{ and } i=j \text{ or } i=k\}$



3) CFG for all strings w/ $\Sigma\{a,b\}$ w/ at most 2 as anywhere in string

$RE = b^*(a+\epsilon)b^*(a+\epsilon)b^*$

$S \to BABA$
$B \to bB \mid \epsilon$
$A \to a \mid \epsilon$

4) $E \to E+T \mid T$

$T \to T*F \mid F$

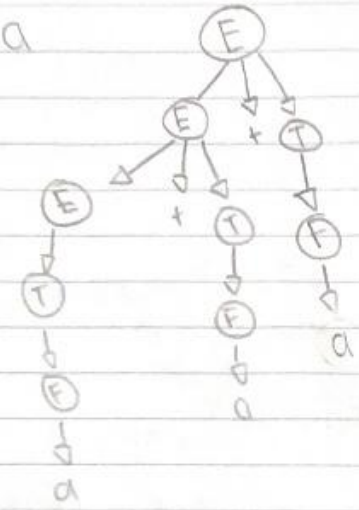
$F \to (E) \mid a$

Parse tree for

a. a+a+a

b. ((a))

a+a+a



((a))

5) CFG for {a,b}*

a. {w | w has at least 3 as anywhere in string}

$(a+b)^* a (a+b)^* a (a+b)^* a (a+b)^*$
B B B B

W → BaBaBaB
B → aB | bB | ε

b. {w | the set of all strings w/ more as than bs}
W → ABS
S → AB | BB
A → Aa | BA
B → ABb | b | ε

6) CFG to CNF A → BAB | B | ε, B → 00 | ε

① remove B → ε
A → BAB | AB | BA | A | B | ε
B → 00

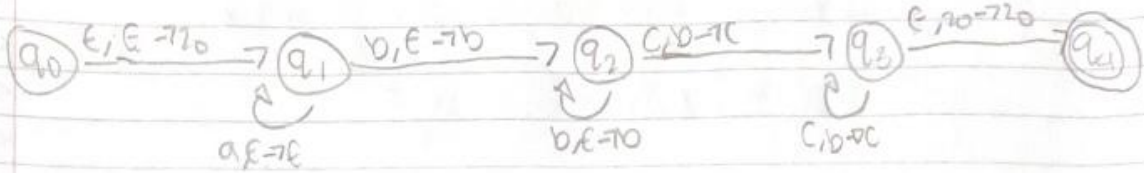
② remove A → B and A → A
A → B
A → 00
A → BAB | AB | BA | 00 | ε
B → 00
(00 → X)

A → BAB | ABBA | XX | ε
B → XX
X → 0

A → By | AB | BA | XX | ε
B → XX
A → 0
y → AB

7) PDA

a. $A = \{a^m b^n c^n \mid m, n \geq 0\}$



b. $\{a^n b^n c^m \mid m, n \geq 0\}$