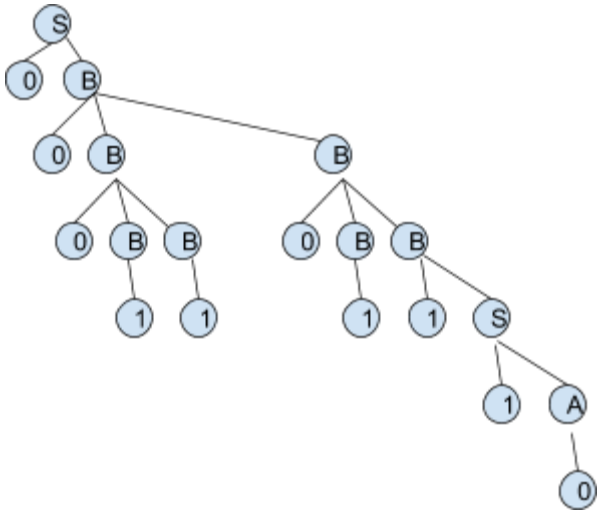
CFG

1. Given the CFG grammars below, give a leftmost/rightmost derivation for w.
   a. $G = (\{S, A, B\},\ \{0, 1\},\ \{S \to 0B \mid 1A,\ A \to 0 \mid 0S \mid 1AA,\ B \to 1 \mid 1S \mid 0BB\})$,
   $w = 0001101110$
   Sol.

   B: Moca David
   Leftmost: 1 8 8 6 6 8 6 7 2 3
   $S \Rightarrow 0B \Rightarrow 00BB \Rightarrow 000BBB \Rightarrow 0001BB \Rightarrow 00011B \Rightarrow 000110BB \Rightarrow 0001101B$
   $\Rightarrow 00011011S \Rightarrow 0001101111A \Rightarrow 0001101110$

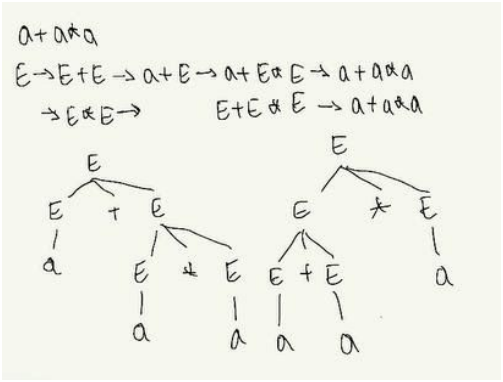


   B: Neta Razvan
   Rightmost: 1 8 7 2 3 8 6 7 2 3
   S ⇒ 0B ⇒ 00BB ⇒ 00B1S ⇒ 00B11A ⇒ 00B110 ⇒ 000BB110
   ⇒ 000B1110 ⇒ 0001S1110 ⇒ 00011A1110 ⇒ 0001101110

   b. $G = (\{E, T, F\},\ \{a, +, *, (,)\},\ \{E \to E + T \mid T,\ T \to T * F \mid F,\ F \to (E) \mid a\})$
   $w = a * (a + a)$
   HW

2. Prove that the following grammars are ambiguous
   a. $G_1 = (\{S, B, C\},\ \{a, b, c\},\ \{S \to abC \mid aB,\ B \to bC,\ C \to c\},\ S)$ HW
   b. $G_2 = (\{E\},\ \{a, +, *, (,)\},\ \{E \to E + E \mid E * E \mid (E) \mid a\},\ E)$

   Sol. IW #inmeet

w=a+a*a 

c. $G_3 = (\{S\},\ \{if,\ then,\ else,\ a,\ b\},\ \{S \rightarrow\ if\ b\ then\ S \mid if\ b\ then\ S\ else\ S \mid a\},\ S)$
HW

Recursive descendent parser

1. Given the CFG $G = (\{S\}, \{a, b, c\},\ \{S \rightarrow aSbS \mid aS \mid c\})$, parse the sequence $w = aacbc$ using rec. desc. Parser.

Sol.
VA+B: Dragos P., Andrei O.,

$(q, 1, \varepsilon, S) \mid\!- exp\ (q, 1, S_1, aSbS) \mid\!- adv\ (q, 2, S_1a, SbS) \mid\!- exp\ (q, 2, S_1aS_1, aSbSbS) \mid\!-$
$adv(q, 3, S_1aS_1a, SbSbS)$ |- $exp\ (q, 3, S_1aS_1aS_1, aSbSbSbS) \mid\!- mi\ (b, 3, S_1aS_1aS_1, aSbSbSbS)$
|- $at\ (q, 3, S_1aS_1aS_2, aSbSbS) \mid\!- mi(b, 3, S_1aS_1aS_2, aSbSbS) \mid\!- at(q, 3, S_1aS_1aS_3, cbSbS)$
|-
$adv(q, 4, S_1aS_1aS_3c, bSbS) \mid\!- adv(q, 5, S_1aS_1aS_3cb, SbS) \mid\!- exp(q, 5, S_1aS_1aS_3cbS_1, aSbSbS)$
|-
$mi(b, 5, S_1aS_1aS_3cbS_1, aSbSbS) \mid\!- at(q, 5, S_1aS_1aS_3cbS_2, aSbS) \mid\!- mi(b, 5, S_1aS_1aS_3cbS_2, aSbS)$
|- $at(q, 5, S_1aS_1aS_3cbS_3, cbS) \mid\!- adv(q, 6, S_1aS_1aS_3cbS_3c, bS) \mid\!- mi(b, 6, S_1aS_1aS_3cbS_3c, bS)$
|- $bk(b, 5, S_1aS_1aS_3cbS_3, cbS) \mid\!- at(b, 5, S_1aS_1aS_3cb, SbS) \mid\!- bk(b, 4, S_1aS_1aS_3c, bSbS)$ |-
$bk(b, 3, S_1aS_1aS_3, cbSbS) \mid\!- at(b, 3, S_1aS_1a, SbSbS) \mid\!- bk(b, 2, S_1aS_1, aSbSbS) \mid\!- at(q, 2, S_1aS_2, aSbS)$
|-
$adv(q, 3, S_1aS_2a, SbS) \mid\!- exp, mi, at, mi, at(q, 3, S_1aS_2aS_3, cbS) \mid\!- adv\ adv(q, 5, S_1aS_2aS_3cb, S)$
|-
$exp,\ mi, at, mi, at(q, 5, S_1aS_2aS_3cbS_3, c) \mid\!-\ adv(q, 6, S_1aS_2aS_3cbS_3c, \varepsilon) \mid\!-\ succ(f, 6, S_1aS_2aS_3cbS_3c, \varepsilon)$

Parse tree repr. As seq of production nos: $S_1S_2S_3S_3$