

# Seminar 7

1.

$$1. L = \{a^{2m} \mid m \in \mathbb{N}\}$$

gr. reg.:

$$S \rightarrow aA$$

$$A \rightarrow a$$

$$A \rightarrow aB$$

$$B \rightarrow aA$$

$$S \rightarrow E$$

gr. indep:

$$S \rightarrow aSa$$

$$S \rightarrow E$$

$$S \rightarrow E$$

$$S \rightarrow AS$$

$$AS \rightarrow aSa$$

gr. care nu e ind:

2.

$$3. L = \{a^m b^n c^m \mid m \in \mathbb{N}^*\}$$

gramatica:

$$S \rightarrow abc \quad (1)$$

$$S \stackrel{(2)}{\Rightarrow} aSBc \stackrel{(2)}{\Rightarrow} aaSBcBC \stackrel{(4)}{\Rightarrow} aaa\cancel{b} \underline{c} BCBC \Rightarrow$$

$$S \rightarrow aSBC \quad (2)$$

$$\stackrel{(3)}{\Rightarrow} aaa\cancel{b} BCBC \stackrel{(4)}{\Rightarrow} aaa\cancel{b} \underline{c} BCBC \stackrel{(3)}{\Rightarrow}$$

$$CB \rightarrow BC \quad (3)$$

$$\stackrel{(2)}{\Rightarrow} aaa\cancel{b} \underline{c} BCBC \stackrel{(3)}{\Rightarrow} aaa\cancel{b} \underline{c} BCC \stackrel{(4)}{\Rightarrow} aaa\cancel{b} \underline{c} BCC \Rightarrow aaa\cancel{b} \underline{c} BCC$$

$$bB \rightarrow bb \quad (4)$$

tip 1

$$1. L = \{ww \mid w \in \{a,b\}^*\}$$

gramatica

$$\begin{array}{l} S \rightarrow AA \\ A \rightarrow aA \\ A \rightarrow bA \\ A \rightarrow \epsilon \\ A \rightarrow ab \end{array}$$

un limbaj similar cu este:  $L' = \{w\tilde{w} \mid w \in \{a,b\}^*\}$

$\tilde{w}$  oglinditul lui

$$\begin{array}{l} S \rightarrow \epsilon \\ S \rightarrow aSa \\ S \rightarrow bSb \\ \sim \\ L' \end{array}$$

$$\begin{array}{ll} S \rightarrow aSA & aA \rightarrow Aa \quad (1) \\ \Rightarrow S \rightarrow bSB & bA \rightarrow Ab \quad (7) \\ B \rightarrow S \rightarrow M & aB \rightarrow Ba \quad (8) \\ MB \rightarrow \cancel{M}b & bB \rightarrow Bb \quad (9) \\ M \rightarrow \cancel{M}a & M \rightarrow \epsilon \quad (10) \end{array}$$

pt.  $\underbrace{abb}_{W} \underbrace{abb}_{W}$

$S \stackrel{(1)}{\Rightarrow} aSA \stackrel{(2)}{\Rightarrow} abSBA \stackrel{(3)}{=} abbSBBA \stackrel{(4)}{=} abbMBBA \stackrel{(5)}{=} abbM6B\beta \stackrel{(6)}{=}$   
 $aabbMBbA \stackrel{(7)}{=} abbm6bA \stackrel{(8)}{=} abbm6BAb \stackrel{(9)}{=} abbm6MA65 \stackrel{(10)}{=} abbmabbb \stackrel{(11)}{=}$   
 $\Rightarrow abbaabb$

4.  $L = \{a^m b^n c^m d^m \mid m \in \mathbb{N}^*\}$

$S \rightarrow abcd \quad (1)$

$S \stackrel{(2)}{\Rightarrow} aSBcd \stackrel{(2)}{=} aaSBCd \stackrel{(3)}{=} a^{ocd}BCd$

$S \rightarrow aSBCd \quad (2)$

$\Rightarrow aaaBCdBCdBCd \stackrel{(3)}{=}$

$dB \rightarrow Bd \quad (3)$

$\Rightarrow acaBCBdc\underline{dBCd} \stackrel{(3)}{=}$

$dc \rightarrow Cd \quad (4)$

$\Rightarrow acaaBCBd\underline{C}BdCd \stackrel{(4)}{=}$

$cB \rightarrow BC \quad (5)$

$\Rightarrow aaaaBC\underline{BC}d\underline{BdCd} \stackrel{(5)}{=}$

$aB \rightarrow a5 \quad (6)$

$\Rightarrow aaaaBCBCd\underline{BCdd} \stackrel{(3), (5)}{=}$

$bB \rightarrow bb \quad (7)$

$\Rightarrow aaaaBC\underline{BCBC}dd \stackrel{(5)}{=}$

$bC \rightarrow bc \quad (8)$

$\Rightarrow aacc\underline{BBC}C\underline{BC}dd \stackrel{(6)}{=}$

$cC \rightarrow cc \quad (9)$

$\Rightarrow aaca\underline{BBC}CCdd \stackrel{(5)}{=}$

$\Rightarrow aaaa\underline{BBC}CCCdd \stackrel{(6)}{=}$

$\Rightarrow aaca\underline{b}BBCCCdd \stackrel{(7)}{=}$

$\Rightarrow aaca\underline{bb}BBCCCdd \stackrel{(7)}{=}$

$\Rightarrow aaaa\underline{bbb}CCCdd \stackrel{(8)}{=}$

$\Rightarrow aaaa\underline{bbb}CCdd \stackrel{(9)}{=}$

$\Rightarrow aaaa\underline{bbb}cccdd \stackrel{(9)}{=}$

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7.  $L = \{a^m b^n c^m d^m \mid m, n \in \mathbb{N}\}$

gramatica

$S \rightarrow AB$

$A \rightarrow aBb$

$B \rightarrow \epsilon$

$B \rightarrow cBd$

$B \rightarrow \epsilon \quad \text{tip } 2$

5.  $L = \{a^{2^m} \mid m \in \mathbb{N}\}$

$S \rightarrow XaY \quad (1)$

$Y \rightarrow BY \quad (2)$

$aB \rightarrow Baa \quad (3)$

$XB \rightarrow X \quad (4)$

$X \rightarrow \epsilon \quad (5)$

$Y \rightarrow \epsilon \quad (6)$

tip 0

$S \stackrel{(1)}{\Rightarrow} XaY \stackrel{(2)}{\Rightarrow} XaaBY \stackrel{(3)}{\Rightarrow} XBaaaY \stackrel{(4)}{=} aaaa$   
 $\Rightarrow XaaY \stackrel{(2)}{\Rightarrow} XaaBY \stackrel{(3)}{\Rightarrow} XaBaay \stackrel{(4)}{=} aaaa$   
 $\Rightarrow XBaaaaY \stackrel{(3)}{\Rightarrow} XaaaaY \stackrel{(5)}{\Rightarrow} aaaaa \stackrel{(6)}{=}$

11.  $L = \{w \mid w \in \{a, b\}^*, w \text{ incepe si se termine cu acelasi simbol}\}$

$S \rightarrow \epsilon$

$S \rightarrow aXa$

$S \rightarrow bXb$

$X \rightarrow aX$

$X \rightarrow bX$

$$8. L = \{a^n b^m c^m d^n f \mid n, m \in \mathbb{N}\}$$

$$S \rightarrow a B d$$

$$S \rightarrow \beta$$

$$B \rightarrow b B c$$

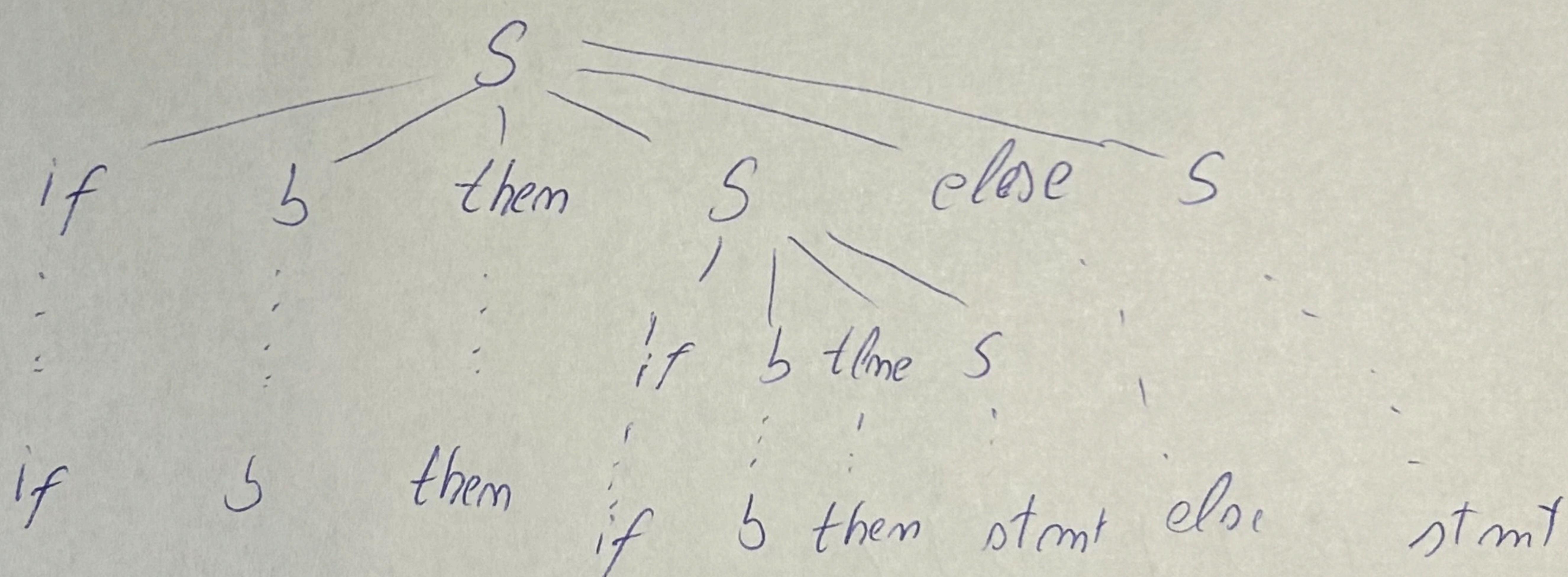
$$B \rightarrow E$$

Q2

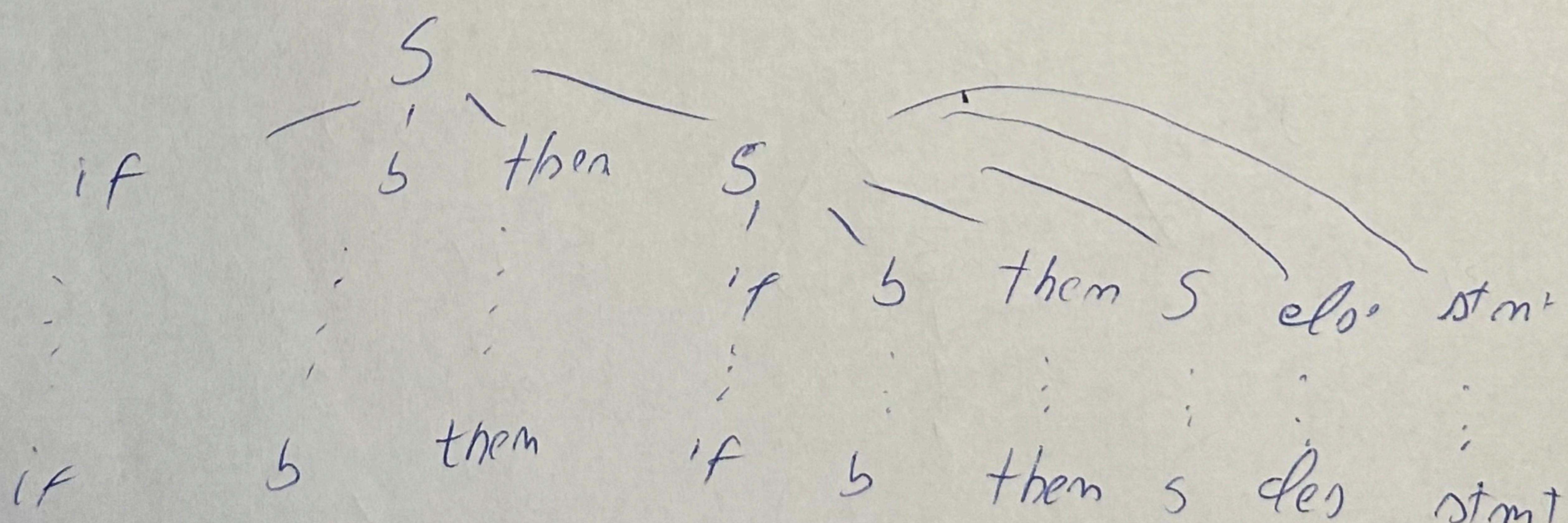
b)  $S \rightarrow \text{if } b \text{ then } S \text{ else } S$

$$S \rightarrow \text{if } b \text{ then } S$$

$$S \rightarrow \text{stmt}$$



San



Sunt echivalente dar arbori diferit.

$S \rightarrow$  if grammatica meambigua et valenta

$S \rightarrow$  if b then  $S'$  else  $S$

$S \rightarrow$  otmt

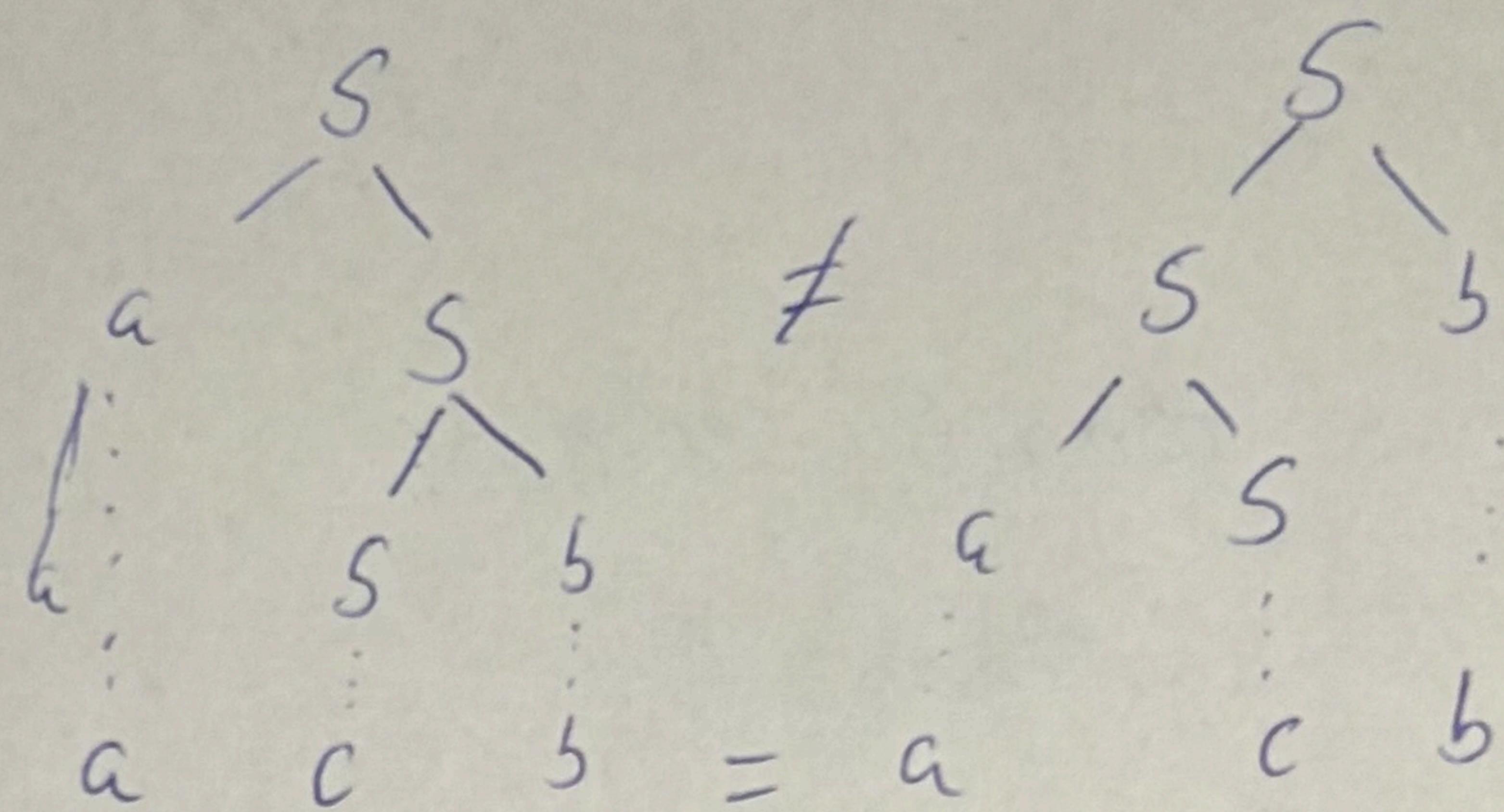
$S' \rightarrow$  if b then  $S'$

$S' \rightarrow$  dtmt

a)  $S \rightarrow aS$

$S \rightarrow bS$

$S \rightarrow c$



$S \rightarrow aS$

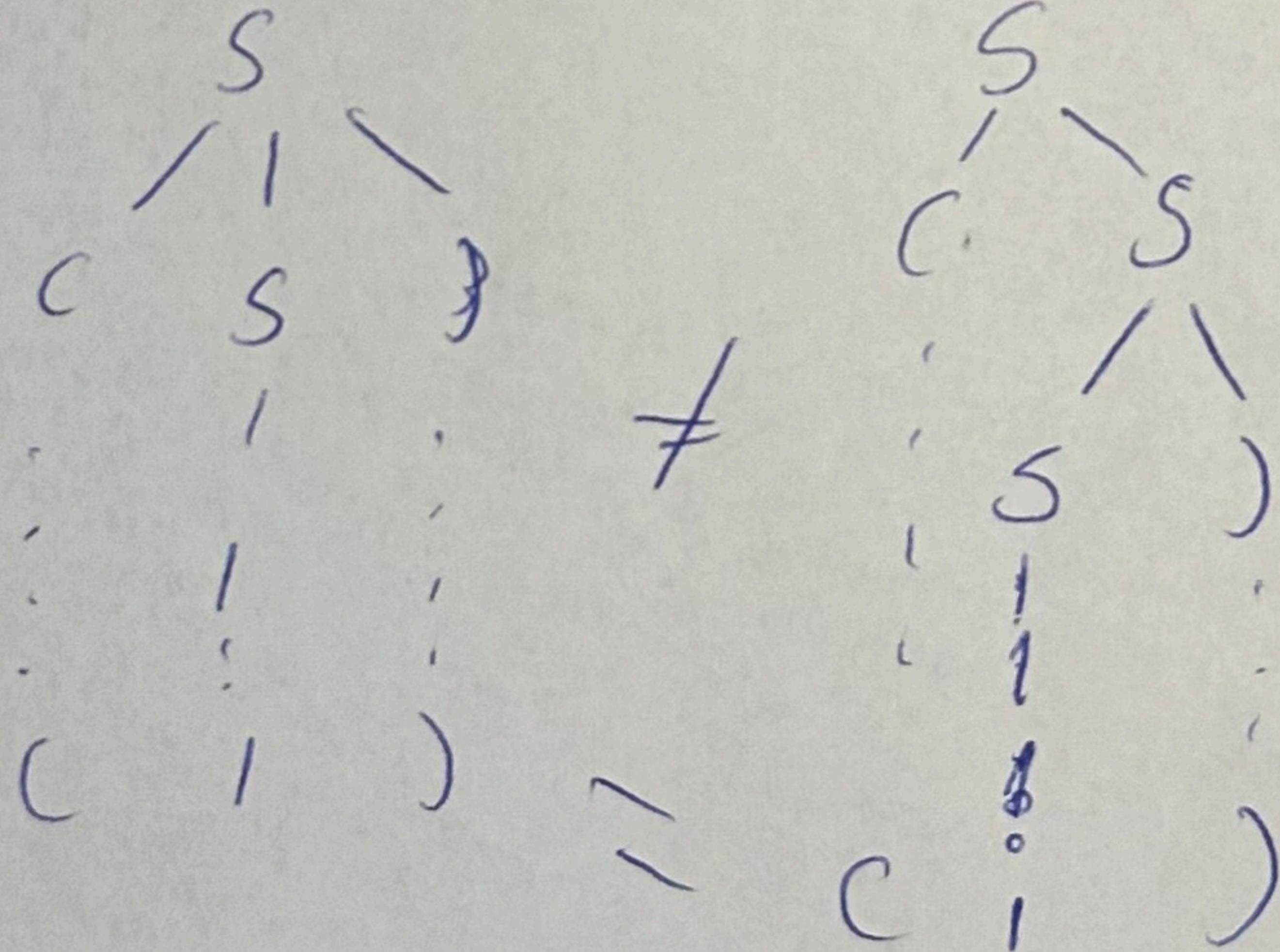
$S \rightarrow bS$

$S \rightarrow c$

$S' \rightarrow \$S'b$

$S' \rightarrow \$c$

c)  $S \rightarrow (S \mid S) \mid (S) \mid I$



$S \rightarrow CS$

$S \sim S')$

$S \rightarrow I$

$S' \sim S')$

$S' \rightarrow I$