CSC 220

10/15/2020

$L = \{a, ab\}$

$S \rightarrow a \mid ab$ finite

$L = \{a^n b \mid n \in N\}$ infinite

$S \rightarrow b \mid aS$

if $n=0$ $a^n b = a^0 b = \lambda b = b$

if $n=1$ ab

if $n=2$ aab

$aaab$

$aaaab$

.

.

.

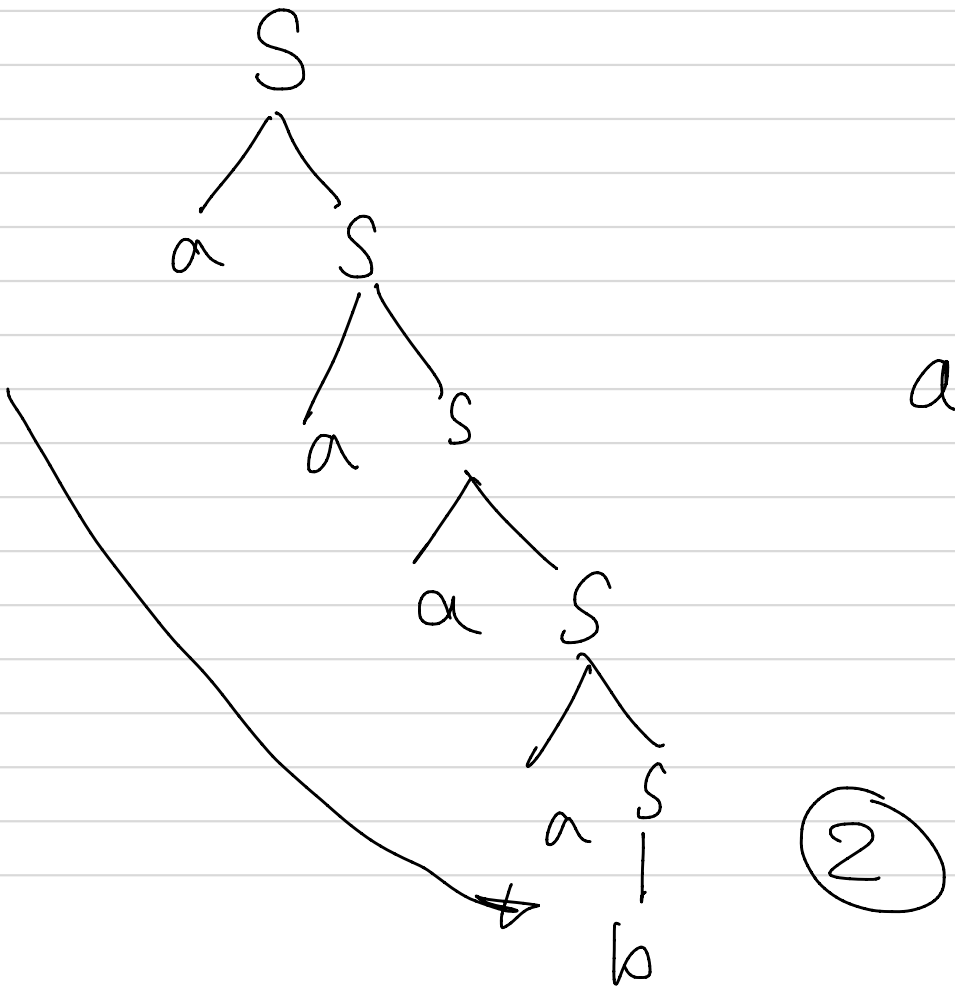
$L = \{ b, ab, aab, aaab, aaaab, \cdots \}$

. $S \longrightarrow b$

.. $S \longrightarrow aS \longrightarrow ab$

... $S \longrightarrow aS \longrightarrow aaS \longrightarrow aab$

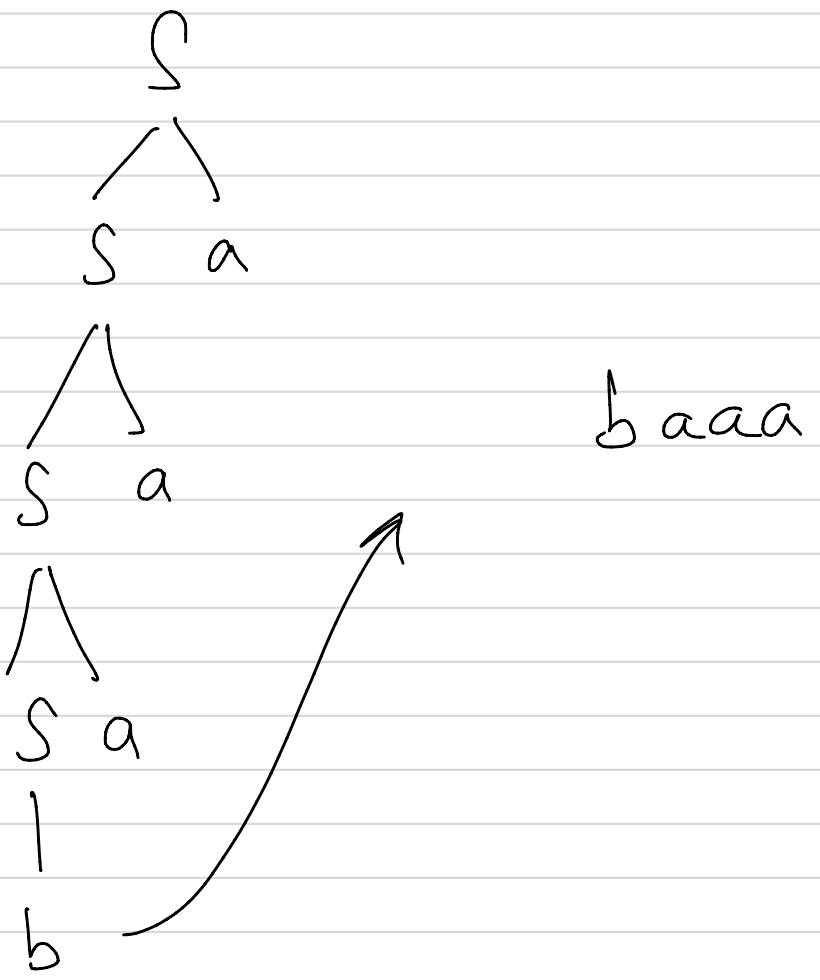
or



aaaab

(2)

$S \rightarrow b \mid Sa$



$S \rightarrow b$

$S \rightarrow Sa \rightarrow ba$

$S \rightarrow Sa \rightarrow Saa \rightarrow baa$

$S \rightarrow Sa \rightarrow Saa \rightarrow Saaa \rightarrow baaa$

ba^n

. $\{ a^n \mid n \in \mathbb{N} \} = \{ \lambda, a, aa, aaa, \ldots \}$

$S \rightarrow aS \mid \lambda$

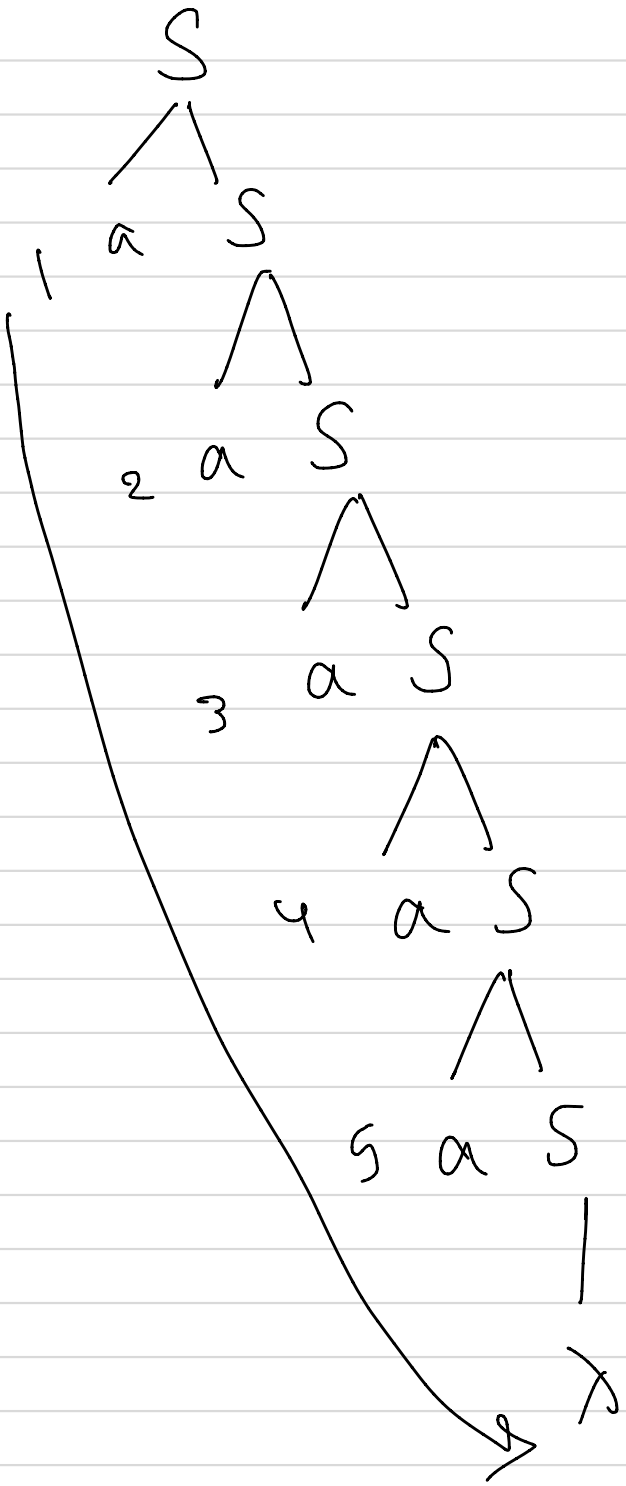
$S \rightarrow \lambda$ λ

$S \rightarrow aS \rightarrow a\lambda$ a

$S \rightarrow aS \rightarrow aaS \rightarrow aa\lambda$ aa

$S \rightarrow aS \rightarrow aaS \rightarrow aaaS \rightarrow aaa\lambda$ aaa

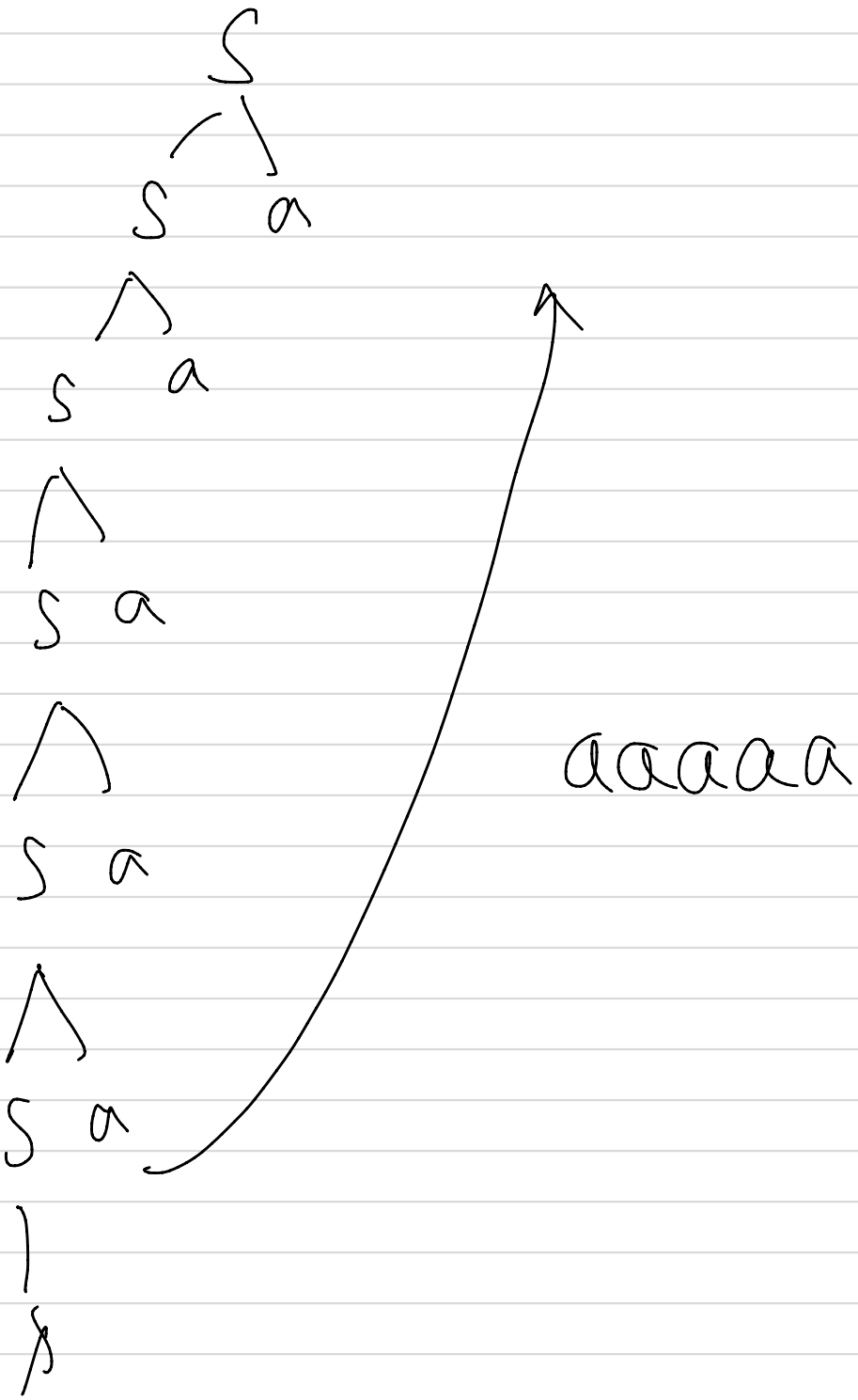
derivation of aaaaa



aaaaa

5

$S \rightarrow \lambda \mid Sa$



aaaaa

$S \rightarrow \lambda \mid aS$

$S \rightarrow \lambda \mid Sa$

. A language might have more than one grammar.

$$L = \{(ab)^n \mid n \in \mathbb{N}\}$$

$$= \{\lambda, ab, abab, \ldots\}$$

$$S \longrightarrow \lambda \mid abS$$

$S \to abS \to ab\lambda$ $\quad ab$

$S \to abS \to ababS \to abab\lambda$ $\quad abab$

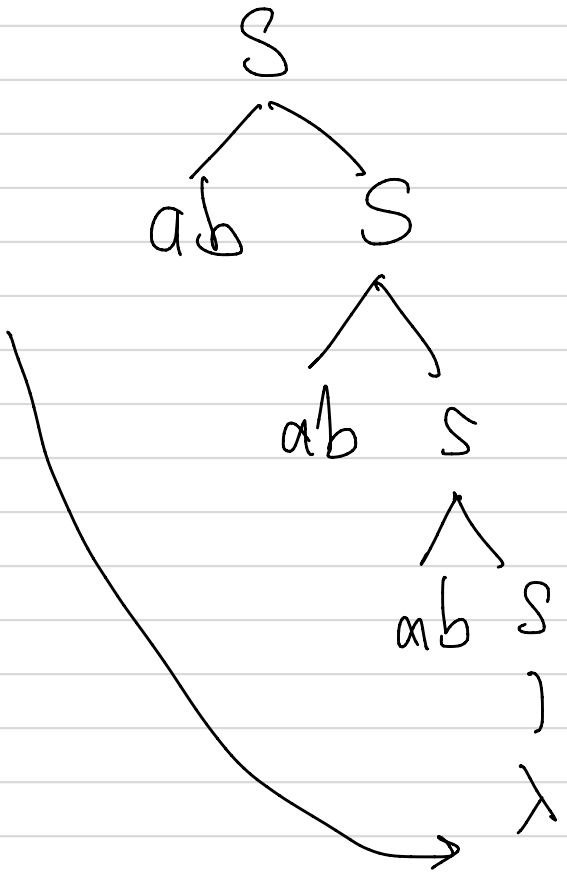
$S \to abS \to ababS \to ababab S \to ababab\lambda$

$S \to \lambda \mid Sab$

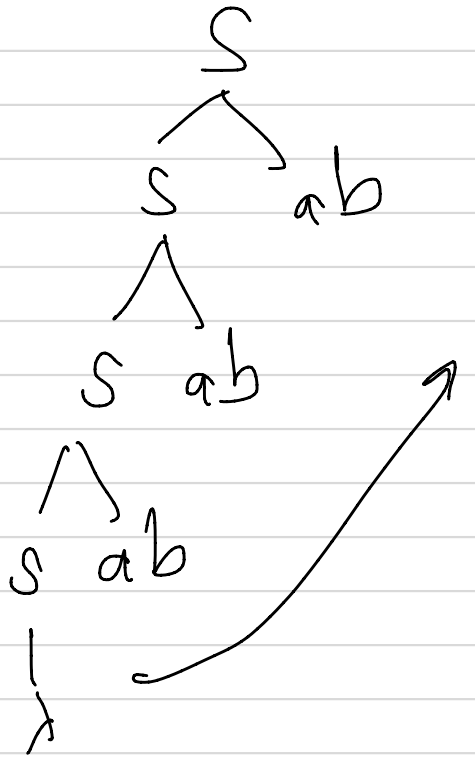
$S \to Sab \to \lambda ab$ $\qquad$ ab

$S \to Sab \to Sabab \to \lambda abab$

$S \to Sab \to Sababab \to \lambda ababab$



$ababab\lambda$



$\lambda ababab$

$$L = \{ a^n b^n \mid n \in \mathbb{N} \}$$

$$= \{ \lambda, ab, aabb, aaabbb, \ldots \}$$

$$S \longrightarrow aSb \mid \lambda$$