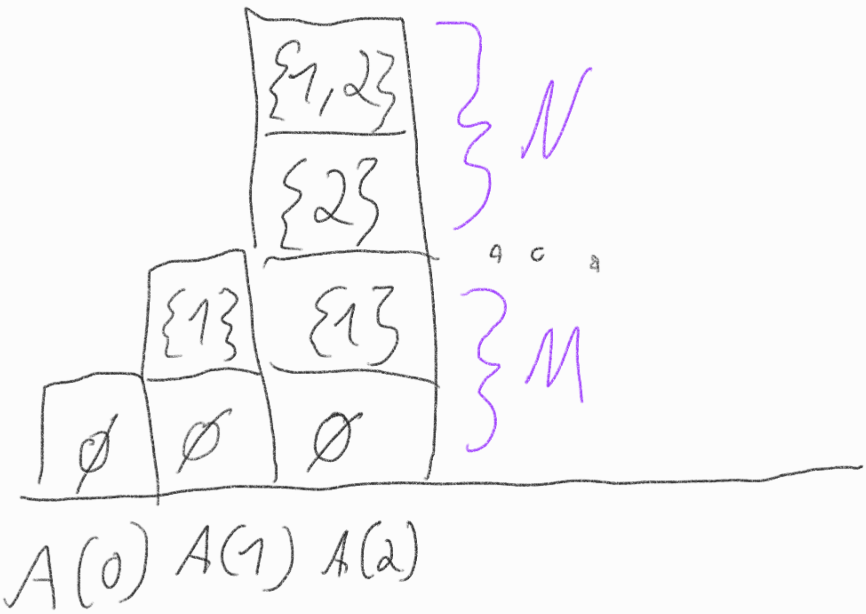
Def.

1) $A(0) =_{def} \{\emptyset\}$

$A(n+1) =_{def} A(n) \cup \{X \mid X = X' \cup \{n+1\}, X' \in A(n)\}$



Satz: $\#(A(n)) = 2^n$ (IV)

(IA) $\#(A(0)) = 1 = 2^0$

(IS) $n \to n+1$

$$A(n+1) = P(\{1,2,\dots,n+1\}) \quad N$$

$$= \underbrace{P(\{1,2,\dots n\})}_{} \cup \overbrace{\{X \mid X = X' \cup \{n+1\},\ X' \in P(\{1,\dots,n\})\}}^{N}$$

$M \cap N = \emptyset$

$$= 2 \cdot \# P(\{1,\dots,n\}) = 2 \cdot A(n)$$

$$A(n+1) = 2 \cdot A(n) \overset{(IV)}{=} 2 \cdot 2^n = 2^{n+1}$$

2)

i) $\boxed{\Sigma} = \{a, \dots, z, A, \dots, Z, 0, \dots, 9\}$

$\boxed{N'} = \{B'\}$ $\boxed{S} = \{S'\}$

$\boxed{P'} = \bigcup \{S' \to xB',$

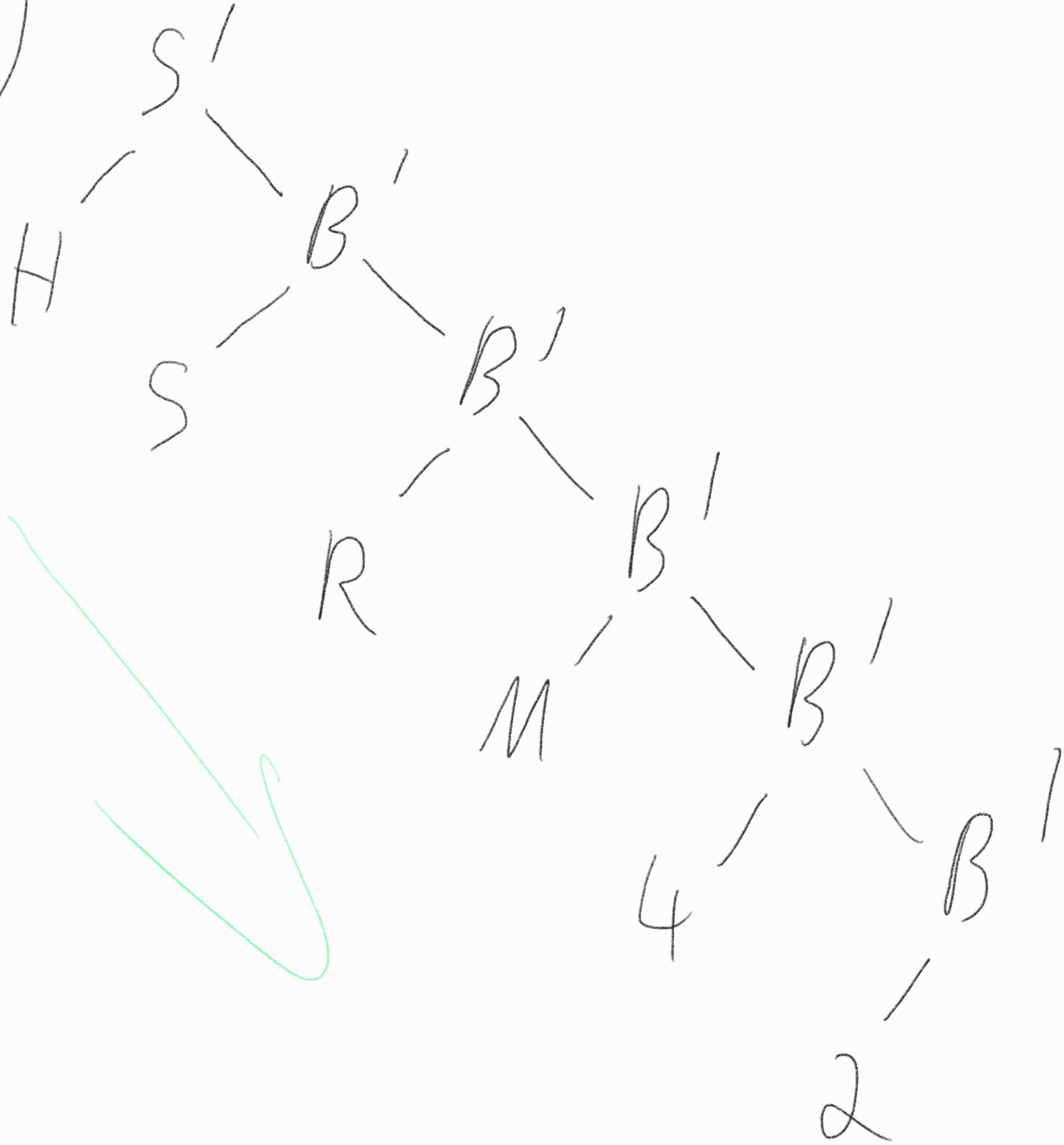
$S' \to x\}$

$x \in \{a, \dots, z, A, \dots, Z\}$

$\cup \bigcup \{B' \to xB', B' \to x\}$

$x \in \Sigma$

ii)



3) i) – neues Nichtterminalsymbol R_A

- Neue Regel $A \to w$, wobei w ein Wort mit einem Terminalsymbol $a \in \Sigma$
- In w das a wird durch R_A
- Am Ende brauchen wir noch eine Regel $R_A \to a$

$$G = (\Sigma, N, P, S)$$

ii) $L(G)$:

$P = \{A \to B_1 B_2, B_3, \dots B_k\}, k \geq 3$

$N = \{A, B_1, B_2, \dots, B_k\}$

$L(G'')$:

$P'' = \{C \to DE\}$

$N'' = \{C, D, E\}$

dadurch wird:

$A \to B_1 C_1$

$C_1 \to B_2 \; C_2$

$C_2 \to B_3 C_3$

$\vdots$

$C_{k-1} \to B_k C_k$, $C_1, \ldots, C_{k-1}$

neue Nichtterminalsymbole

$C_1, \ldots, C_{k-1} \notin N$

aber $C_1, \ldots, C_k \in N'$

4)

$L_1 =_{def} \{ a^n b^m c^{n+m} \mid n, m \geq 0 \}$

$S \to \varepsilon$

$S \to a L' D'$

$L' \to a L' D'$

$L' \to F' D'$ $\quad S \to b F' D'$

$F' \to b F' D'$ $\quad S \to F'$

$D' \to c$ $\quad F' \to \varepsilon$

$F' \to bc$

$L_2)$ $S \to \#$, $S \to aSa$

$S \to bSb$