1) 3/14 function

$f: A \to B$. - function a relation

i) total $\forall a \in A$ $\exists f(a) \in B$

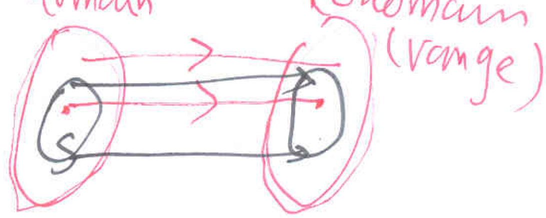
ii) unique $\exists 1 f(a) \in B$.

$\boxed{\begin{array}{l} R(a) = \{b_1 \dots b_n\} \subseteq B \\ f(a) = \{b\} \in B \end{array}}$

$f: \{1, \dots, n\} \to B$. 2^n

$\{0.1\}$

binary string of length n.



$f: A \to B$

$|B^A| = |B|^{|A|}$

$f(a)$, $f(S)$, $f(A)$

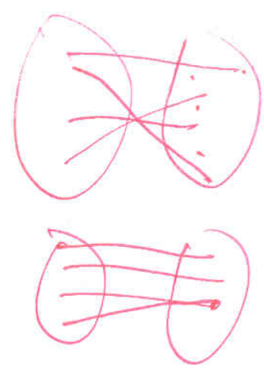
$a \in A$ $S \subseteq A$

we write $f(a)$ instead of $f(\{a\})$

$f: A \to B$

1-1 : unique (inverse ftn) $|A| \le |B|$

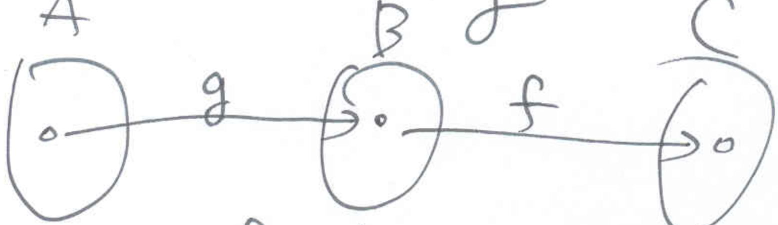
onto : total (")



$\{a, b, c\} = \{a . b, c\}$

$\{a . b, c\} \cong_f \{1 . 2 . 3\}$

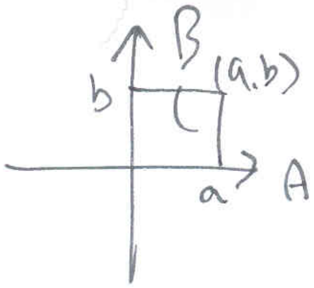
renaming



$g \circ f$ X

$(f \circ g)$ O

Def 11



$f: A \to B$

Sequence

$\{a_n\}$

$a: \mathbb{N} \to \mathbb{R}$. $a(n)$, a_n

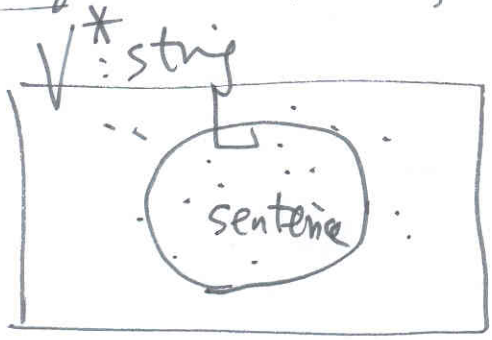
$s: \{1, 2, \ldots n\} \to \{a, b, \ldots z\}$

$s(1) = b$ $s(2) = o$ $s(3) = y$

(b, o, y) boy ... string.
$(1\ 2\ 3)$

$|boy| = 3$

language : a set of strings



$x \overset{?}{\in} L$ ... membership problem

parsing of context-free grammar

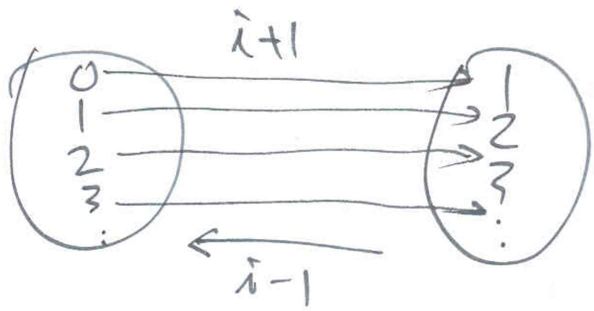
if $x \in L$ ~~then~~ parse tree
$x \notin L$ ~~else~~ say no!
fi

string (sequences) $\longrightarrow$ tree

linear structure $\to$ hierarchical structure

3) countable — finite, countably infinite $|\mathbb{N}|$

uncountable



sum first

lexi~~cograp~~cal order 2nd.

$(1,1), ((1,2)\ (2,1)), ((1,3), (2,2), (3,1)),$

Cantor Diagonal arg.

inf. binary string ≙ power set of natural number