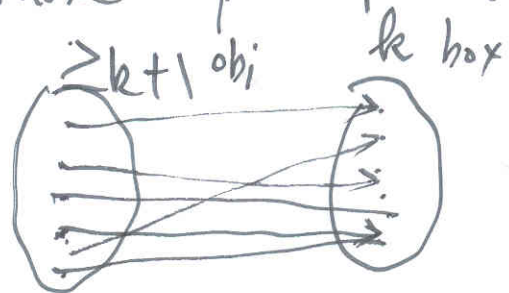


Pigeonhole principle (비둘기 집)



X
1:1

$$f: A \rightarrow B$$

$$|A| > |B|$$

A total > f to B
unique

5.6 Generating permutation and Combination.

- {1, 2, 3}
- 123
 - 132
 - 213
 - ~~312~~
 - 231
 - 312
 - 321

$$A^1 = A$$

$$A^n = A^{n-1} \times A$$

$$(a_1, a_2, \dots, a_n) \in \{1, \dots, n\}^n$$

$$\forall i, j: 1 \leq i, j \leq n, a_i \neq a_j$$

$$1 \leq i \leq n$$

$\langle \dots \rangle \subseteq \{1, \dots, n\}^n \times \{1, \dots, n\}^n \dots$: relation on n-tuples

Next permut

$$a_1 \dots a_n \rightarrow 23415 \rightarrow 23451$$

antisym. $\frac{aRb \wedge bRa}{\rightarrow a=b}$
 asym. $aRb \Rightarrow \cancel{bRa}$

$a_{n-1} < a_n \rightarrow a_1 \dots a_n a_{n-1}$ (ref/irref) partial order
 ref, antisym, trans.

$\wedge a_{n-2} < a_{n-1} \rightarrow$
 $\wedge a_n < a_{n-1}$

$$\leq - \text{ref (irref.)}$$

$$< - \text{irref.}$$

$$\begin{array}{cc} \underline{234165} & \underline{234516} \\ \underline{234561} & \underline{234615} \end{array}$$