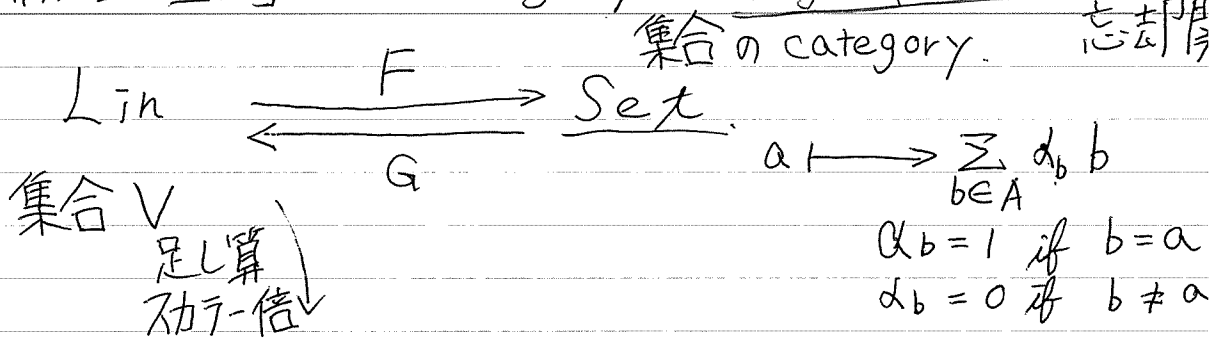
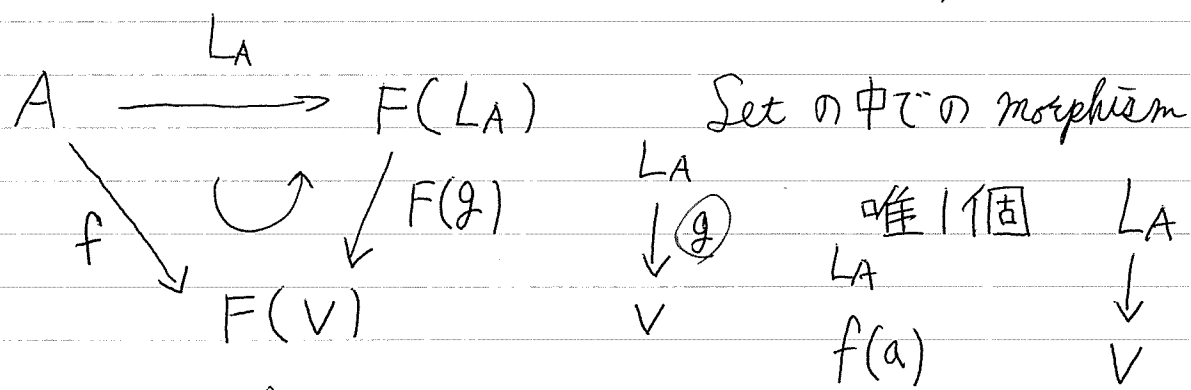


第9回 数理学ⅢA 1/2 (火)  
 線型空間の category forgetful functor

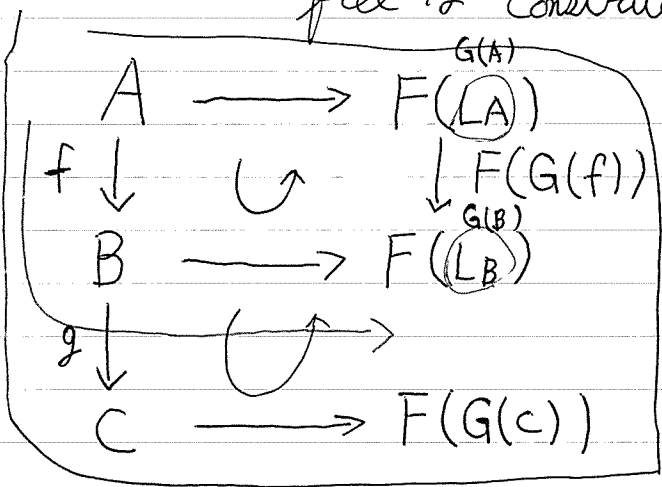


集合  $A$  を基底とする線型空間  
~~有限和~~ 有限和  $\alpha_i \in \mathbb{R}$   
 $\sum_i \alpha_i a_i + \sum_i \beta_i a_i$   
 $a_i \in A$

$= \sum_i (\alpha_i + \beta_i) a_i$        $\beta(\sum_i \alpha_i a_i) = \sum_i \beta \alpha_i a_i$



free to construction



$L_B = V$

唯一個  $L_A = G(A)$

$L_B = G(B)$

$G(g \circ f) = G(g) \circ G(f)$

$$\begin{array}{ccccc}
 A & \longrightarrow & F(G(A)) & & G(A) \\
 \text{id}_A \downarrow & \curvearrowright & \downarrow F(\text{id}_{G(A)}) & & \downarrow \text{id}_{G(A)} \\
 A & \longrightarrow & F(G(A)) & & G(A)
 \end{array}$$

universal な構成

$$\begin{array}{ccc}
 \mathcal{L}_m & \xrightarrow{F} & \text{Set} \\
 A & \xrightarrow{F} & B
 \end{array}
 \quad
 \begin{array}{l}
 A, B : \text{categories} \\
 F : \text{functor} \\
 b \in B
 \end{array}$$

$$b \xrightarrow{p_b} F(G(b)) \in A$$

$$\begin{array}{ccc}
 & \curvearrowright & \downarrow F(p) \\
 f \downarrow & & F(a) \\
 & & \downarrow G(b) \\
 & & a
 \end{array}$$

$$\begin{array}{ccccc}
 \textcircled{\cancel{f}} \downarrow & b_1 & \xrightarrow{p_{b_1}} & F(G(b_1)) & G(b_1) \\
 f \downarrow & \downarrow & \curvearrowright & \downarrow F(G(f)) & \downarrow G(f) \\
 & b_2 & \xrightarrow{p_{b_2}} & F(G(b_2)) & G(b_2)
 \end{array}$$

全単射

