

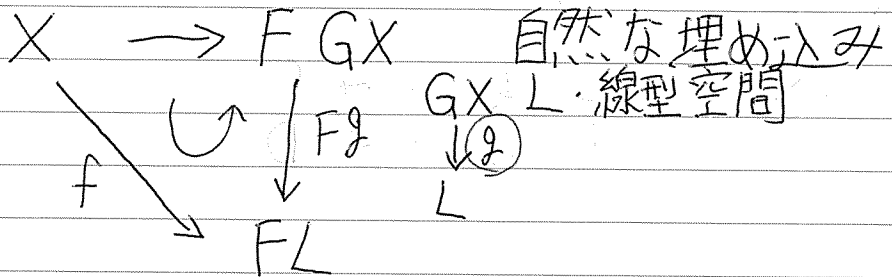
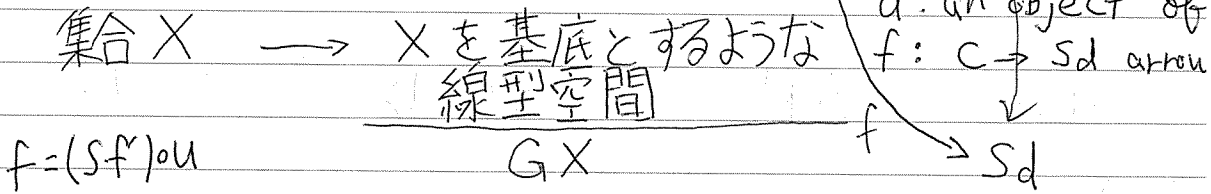
2016年度 数理科学III

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第10回 数理科学ⅢA 6/28(火)

$$f' \begin{matrix} r \\ \downarrow \\ d \end{matrix}$$

F
 $\mathcal{L}in \rightarrow Set$ forgetful functor (忘却)
 線型空間の category 集合の category



定義 $S: D \rightarrow C$ functor (D, C は categories)

$c: \text{an object of } C$

universal arrow from c to S

$\langle r, u \rangle$ $r: \text{an object}$

$u: C \rightarrow S_r$ arrow in

集合の category

$\emptyset = \text{空集合}$

initial object (始対象) X

final object (終対象)

$X \rightarrow \{\ast\}$

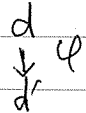
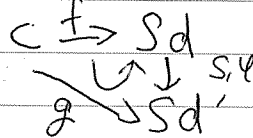
universal arrow

$(C \downarrow S)$

comma category initial object

object $\langle d, c \xrightarrow{f} Sd \rangle$

d は D の object



dual

universal arrow from C to S d $S \xrightarrow{d} C$
 universal arrow from S to C $f \downarrow$ $S \xrightarrow{f} C$
 $\exists!$ $f \downarrow$ $S \xrightarrow{f} C$
 S_r

2 categories の直積 product $\langle C, D \rangle \xrightarrow{\langle f, g \rangle} \langle C', D' \rangle$
 categories $f: C \rightarrow C'$
 $g: D \rightarrow D'$
 $\langle C, D \rangle$ C object of C
 D object of D

C category

$\Delta: C \rightarrow C \times C$ diagonal functor
 (対角関手)

$$\Delta(c) = \langle c, c \rangle$$

$$\Delta(f) = \langle f, f \rangle$$

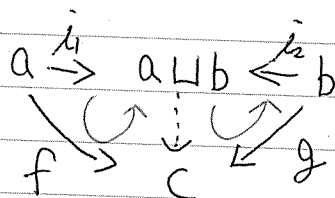
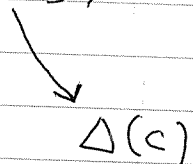
universal arrow

from $\langle a, b \rangle$ to Δ

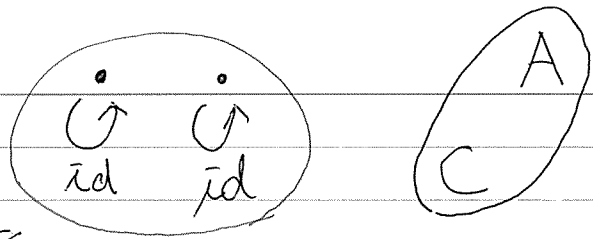
$\langle a, b \rangle$ an object of $C \times C$
 coproduct

$a \sqcup b$ an object of C

$\langle a, b \rangle \rightarrow \Delta(a \sqcup b)$ $\langle a \sqcup b, a \sqcup b \rangle$



CXC



functor
catego

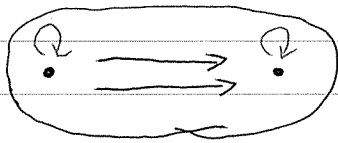
functor object

C
product

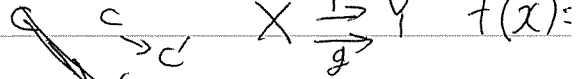
CXC
universal arrow
from

$\langle a, b \rangle$ to $\langle a, b \rangle$

diagonal
functor.



$$\Delta: C \rightarrow C^A$$

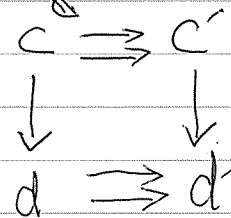


C

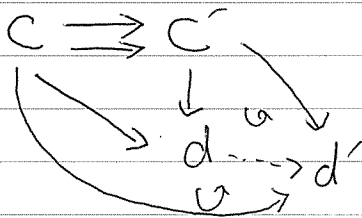
universal arrow



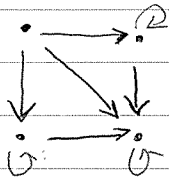
$$\rightarrow \Delta(d)$$



from $\Delta \circ C =$



$\{x \in X \mid f(x) = g(x)\}$
equalizer



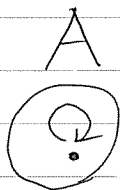
C1 C universal
arrow

$$C_1 \Rightarrow C_2$$

pullback

general nonsense

Grothendieck



C = C terminal object