

2016年度 数理科学III

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内容記述	数理科学IIIA (春学期) 数理科学IIIB (秋学期)
発行年	2016
その他のタイトル	Mathematical Science III
URL	http://hdl.handle.net/2241/00140875

第12回

homology 代数 \Rightarrow 计算机科学

(1) Universal arrows

森田 紀一
Mrita dua

(2) The Yoneda lemma

Prop functor $S: D \rightarrow C$

$\langle r, u = c \rightarrow S_r \rangle$ universal from c to S

$$f' = r \rightarrow d \Rightarrow c \xrightarrow{u} S_r \xrightarrow{Sf'} S_d$$

natural in d $D(r, d) \cong C(c, S_d)$

Definition $\text{hom}_D(x, y)$ 集合 x, y objects of D
 D : category having small hom-sets

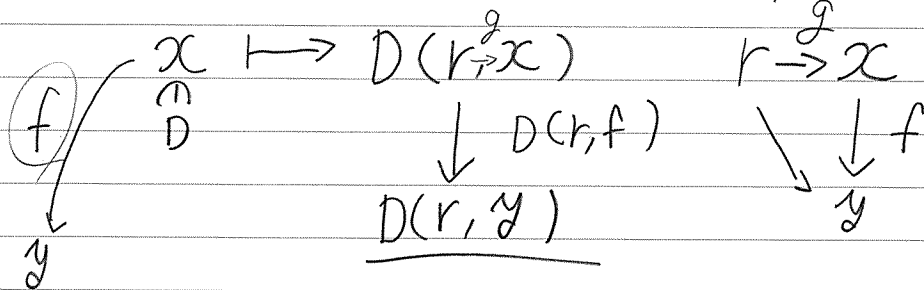
$k: D \rightarrow \text{Set}$ functor r : object of D

$$k(x) \cong D(r, x) \quad k \cong D(r, -)$$

natural isomorphism

$$D(x, y) = \text{hom}_D(x, y)$$

representable (表現可能)
 representing object

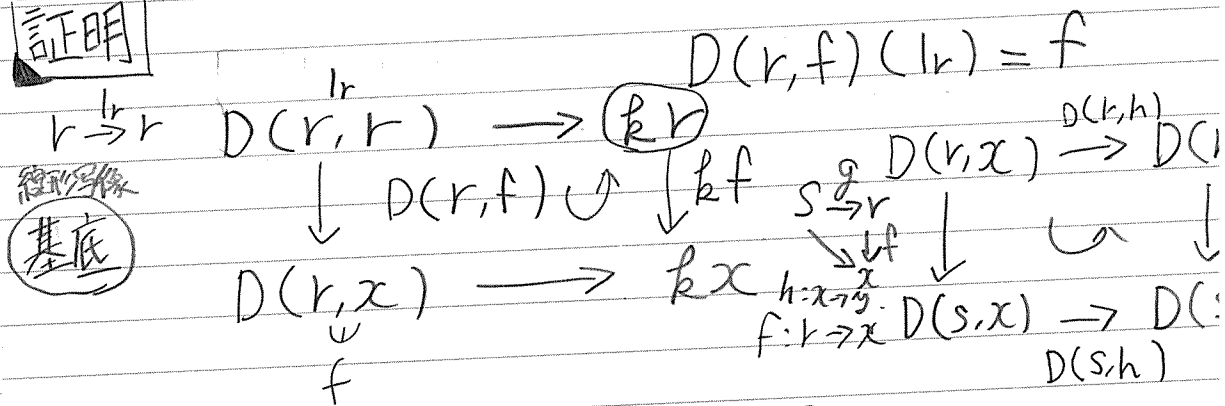


Lemma (Yoneda) $D = \text{category with small hom}$

$k = D \rightarrow \text{Set}$ functor

$r = \text{object in } D$
 $\text{Nat}(D(r, -), k) \cong k r$

証明



Corollary $D \rightarrow \text{Set}$

D category with small hom-sets

$r, s = \text{objects in } D$

$D(r, -)$

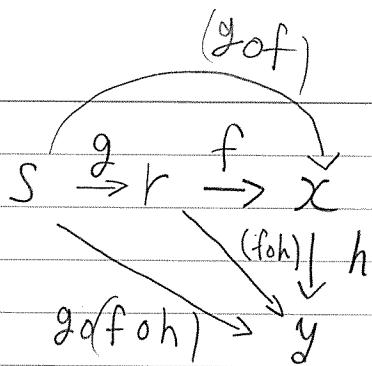
$D(s, -)$

$D(r, r)$

$D(s, r)$

$D(r, x)$

$D(s, x)$



$S = D \rightarrow C$ universal arrow $C \rightarrow S_r$ c object in

$D(r, d) \cong C(c, S_d)$ bijection

$r \xrightarrow{f'} d$

category C の任意の object c $C \rightarrow S_r \xrightarrow{Sf'}$ S_d
 に対して

必ず universal arrow が存在する場合.

$C \ni c' \rightarrow S_{r'}$

$D(r, d) \cong C(c, S_d)$

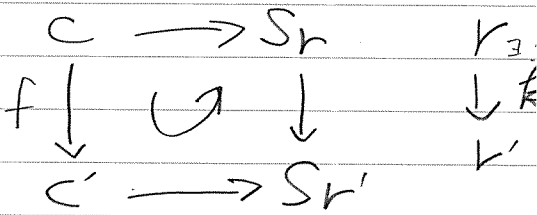
$D(r', d) \cong C(c', S_d)$

$C \xrightarrow{f} c' \xrightarrow{g} S_d$

T : functor
 $T(f \circ f) = T(f) \circ T(f)$

$C \xrightarrow{f} c' \rightarrow S_{r'} \xrightarrow{S_k} S_d$

$k = T(f)$



$r = T(c)$

$r' = T(c')$