Eine Woche, ein Beispiel 7.11 Universal properties

Here we conclude some processes of understanding.

obvious

O Commutative diagram

@ Explicitly description

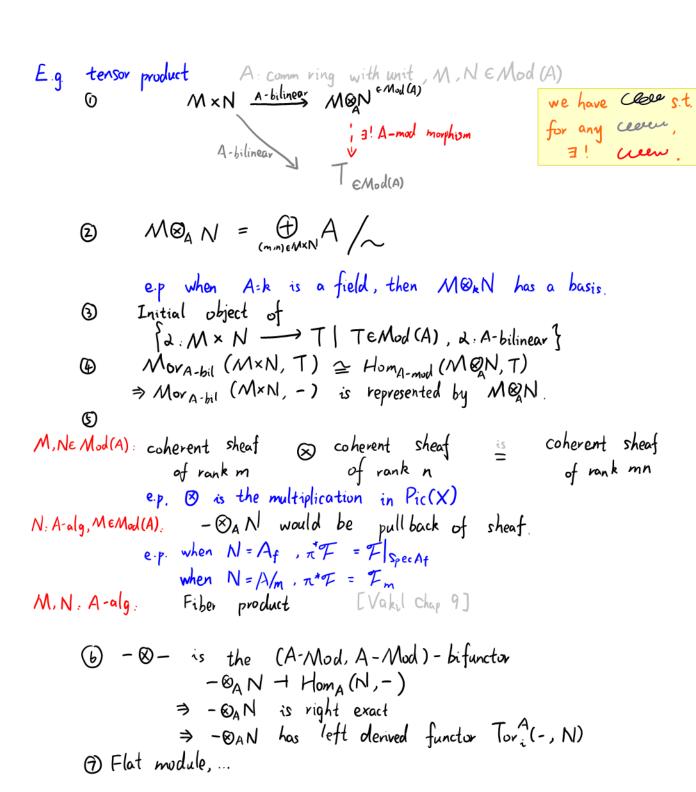
3 Initial object or Final object

@ Adjoint functor or Representable functors

B Geometry

B Functor & Derived functor

To Other properties & Corollary



[2023.05.14] & - category & Hopf algebra > group scheme.

e.g. Kähler differentials k: comm ring with unit 1 A. k-alg $A \xrightarrow{k-\text{derivation}} \Omega_{A/k} \in Mor(A)$ Hochchild Cohomology k-derivation | A-mod morphism

M @ Mor(A) where I := ker (A @ A ->> A) $\Omega_{A/k} = \bigoplus_{\alpha \in A} A d\alpha / \sim \cong I/I^{2} \cong I \otimes_{A \otimes_{A}} A$ $\Rightarrow \Omega_{X/k} = \Delta^*(1)$ If A = k[xi]/(fi), then $A \otimes_k A = k [x_i, y_i] / (f_i(x), f_i(Y))$ = $k [x_i, \Delta_i] / (f_i(X), f_i(X+\Delta))$ $\Delta_i = y_i - x_i$ $\stackrel{\cong}{=} A \left[\Delta_i \right] / \left(f_i \left(x + \Delta \right) \right)$ $I = \langle \Delta_i \rangle$ $I^* = \langle \Delta_i \Delta_{i'} \rangle_{i,i'}$ $A \otimes_k A/I^2 \cong A [\Delta_i]/(\sum_{\substack{i=0 \\ j \neq i}} \Delta_i)_i$ $I/I^* \cong \langle \Delta_i \rangle / (\sum_{\substack{i \in A \\ i \neq k}} \Delta_i) \cong \Omega_{A/k}$ $A \longrightarrow \Omega_{A/k}$ is the initial object of category $fdA \longrightarrow M$ is the derivation? Derk (A, M) = MorA-mod (DA/k, M) 4 \Rightarrow Derk (A, -) is represented by $\Omega_{A/k}$ \Rightarrow Derk(A, A) can be viewed as tangent bundle DIAIR is a sheaf on SpecA. It represents the cotangent bundle of SpecA. A ← B ← K **6** ~ it Days - DA/B -> "contravarient functor $\Omega_{-/\kappa}$ " Let k: comm alg with unit S, S', R: K-alg Θ M: S-mod, M=0 (in S') Prop 1 o - M - S' - S - > Spec S - Spec R Spec S' - Spec R then the lift & is of or a torsor under Derk (R,M) = Morr-mod (PR/M) Prop 2 set S'= S[M], pe Homk-alg (R,S), then $Hom_{s-alg}(R, S[M]) = Der_{k}(R, M_{\varphi})$ Speck - Speck Spec REM] - Speck e.p. let S=R, then Home-alg (R, R[M]) = Derk (R, M) $\frac{Cor}{L}$ formally $\frac{O}{D}$ Prop 1 $\frac{O}{D}$ Der_k $(A, -) = 0 \iff \Omega_{A/k} = 0 \iff \Delta$ is open immersion