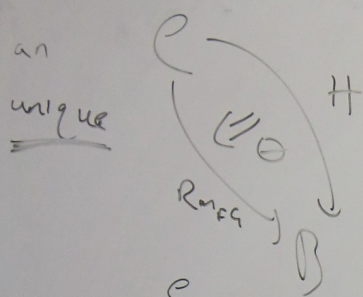
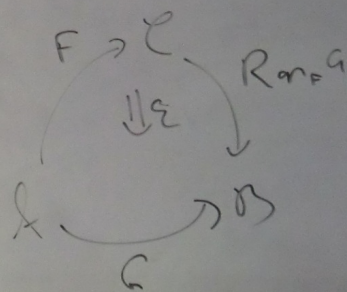
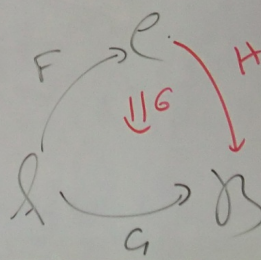
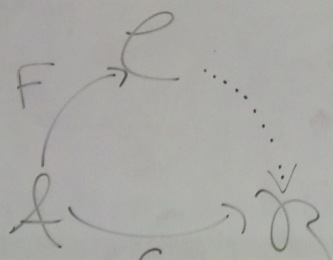


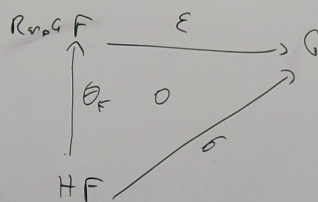
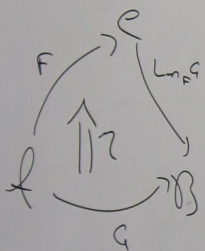
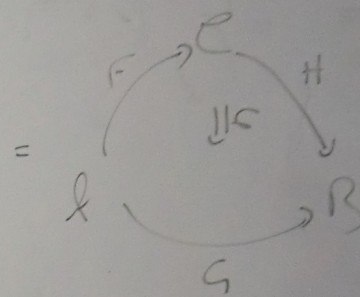
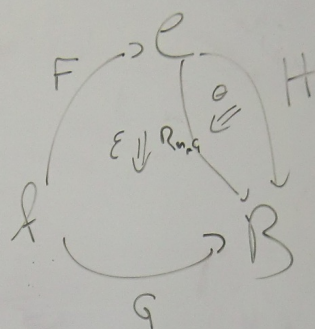
(Weak) Kan Extensions

- Local Kan Extensions
- Global Kan Extensions
- Examples

Suppose we have categories $\mathcal{A}, \mathcal{B}, \mathcal{C}$
and Functors



s.t

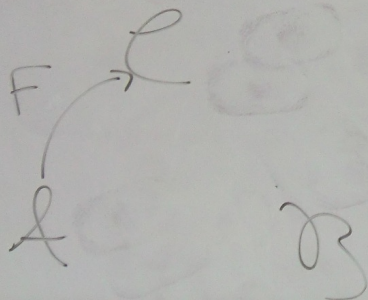


$$\text{Nat}(HF, G) \cong \text{Nat}(H, \underline{R_{\eta \circ F} G})$$

(Weak) Kan Extensions

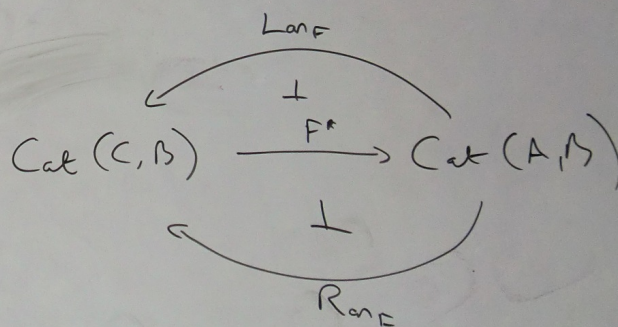
- Local Kan Extensions ✓
- Global Kan Extensions ✓
- Examples ?

Categories $\mathcal{A}, \mathcal{B}, \mathcal{C}$
and Functors



$$\text{Cat}(\mathcal{C}, \mathcal{B}) \xrightarrow{F^*} \text{Cat}(\mathcal{A}, \mathcal{B})$$

$$\mathcal{C} \xrightarrow{H} \mathcal{B} \quad \text{---} \quad \mathcal{A} \xrightarrow{F} \mathcal{C} \xrightarrow{H} \mathcal{B}$$



$$\text{Nat}(kF, G) \cong \text{Nat}(k, R_{on F}G)$$

when do kan extensions exist?

if $\mathcal{A}$ is small and $\mathcal{B}$ is complete

for any $\mathcal{A} \xrightarrow{F} \mathcal{C}$

$R_{on F}$ exists

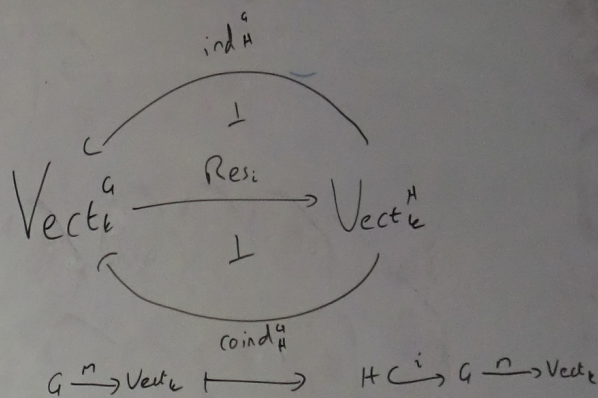
(Weak) Kan Extensions

- Local Kan Extensions ✓
- Global Kan Extensions ✓
- Examples ?

H, G with only one object
in which every morphism
is invertible (i.e. groups)

we've got a faithful functor

$$H \xrightarrow{i} G$$

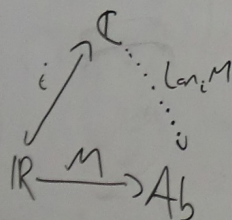


Ab-categories

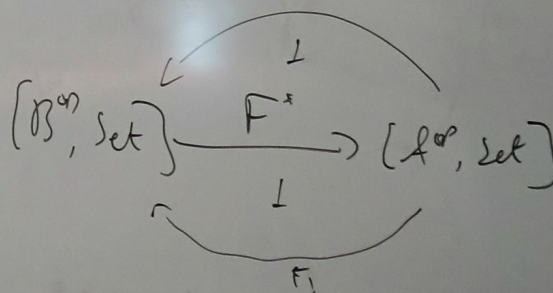
R, S are one object categories

$$R \xrightarrow{L} S$$

eg. given an M -mod M
how do we complexify?



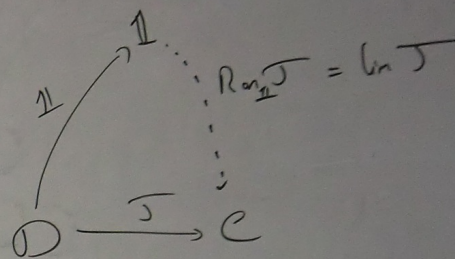
$$A \xrightarrow{F} B$$



(Weak) Kan Extensions

- Local Kan Extensions ✓
- Global Kan Extensions ✓
- Examples ?

Suppose we have a category $\mathcal{C}$
and a diagram $\mathcal{D} \xrightarrow{J} \mathcal{C}$



$$\underline{\text{Nat}(\Delta_{\mathcal{C}}, J) \cong \text{Nat}(\Delta_{\mathcal{C}}, \underline{R_{1,J}})}$$

