Part III Category Theory

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1 Definitions and Examples

Definition (Category)**.** *A category $\mathcal{C}$ consists of*

(a) a collection $\mathrm{ob}\,\mathcal{C}$ *of* ***objects*** *A, B, C, ...*

(b) a collection $\mathrm{mor}\,\mathcal{C}$ *of* ***morphisms*** *f, g, h, ...*

(c) two operations dom, cod *from morphisms to objects. We write $f : A \to B$ or $A \xrightarrow{f} B$ to mean 'f is a morphism and* $\mathrm{dom}\, f = A$ *and* $\mathrm{cod}\, f = B$*'*

(d) an operation assigning to each object A a morphism $1_A : A \to A$

(e) a partial binary operation $(f, g) \mapsto gf$, s.t. gf is defined $\iff$ $\mathrm{dom}\, g = \mathrm{cod}\, f$*, and then $gf : \mathrm{dom}\, f \to \mathrm{cod}\, g$*