Category Abstract

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Определение 0.1. A *category* C consists of

- a collection of objects: $A, B, C, ...$

- a collection of arrows: $f, g, h, ...$

- f o r each arrow f o b j e c t s $\mathrm{dom}(f)$ and $\mathrm{cod}(f)$ called the *domain* and *codomain* of f. If $\mathrm{dom}(f) = A$ and $\mathrm{cod}(f) = B$, we also write $f : A \to B$,

- given $f : A \to B$ and $g : B \to C$, so that $\mathrm{dom}(g) = \mathrm{cod}(f)$, there is an arrow $g \circ f : A \to C$,

- an arrow $\mathrm{Id}_A : A \to A$ for every object A of C,

such that

(Associative law) for every $f : A \to B$, $g : B \to C$ and $h : C \to C$ we have

$$h \circ (g \circ f) = (h \circ g) \circ f, \tag{1}$$

(Unit laws) for every $f : A \to B$ we have

$$f \circ \mathrm{Id}_A = f = \mathrm{Id}_B \circ f. \tag{2}$$

$$\begin{array}{ccc}
A & \xrightarrow{\ f\ } & B \\
 & \searrow^{g \circ f} \ \downarrow^{g} \ \searrow^{g \circ h} & \\
 & C \xrightarrow{\ h\ } & D
\end{array} \tag{3}$$

$$\mathrm{id}_A \ \circlearrowright \ A \longrightarrow B \times C \ \circlearrowleft \ \mathrm{id}_{B \times C}$$

$$A \ \rightleftharpoons \ asd \ \ asd22 \ \ asd22asd \tag{4}$$