

1 Categories

Definition A category, \mathcal{A} is defined to have each of the following,

- (i) A collection of objects, denoted by $\text{ob}(\mathcal{A})$ and written $A, B, C \in \mathcal{A}$.
Such that each object has an ‘identity’, $1_A \in \mathcal{A}(A, A)$, $1_B \in \mathcal{A}(B, B)$, $1_C \in \mathcal{A}(C, C)$
- (ii) For each pair of objects, a collection of ‘links’/morphisms between them, denoted by $\mathcal{A}(A, B)$ and written as $f \in \mathcal{A}(A, B)$ $g \in \mathcal{A}(B, C)$. Such that,
 - (a) morphisms with matching domain,co-domain can be ‘chained’/composed $(g, f) = g \circ f$
 - (b) with this composition being associative, $(h \circ g) \circ f = h \circ (g \circ f)$
 - (c) and they are ‘fixed’ by the identity $f \circ 1_A = f = 1_B \circ f$

Example 1.1.

2 Functors

Example 2.1.

3 Natural Isomorphisms

Example 3.1.