Categories edit

Abbreviation: Cat

Definition 1. A *category* is a structure $\mathbf{C} = \langle C, \circ, \text{dom}, \text{cod}\rangle$ of type $\langle 2, 1, 1\rangle$ such that C is a class,

$\langle C, \circ\rangle$ is a (large) partial semigroup

$\text{dom}(x)$ is a left unit: $\text{dom}(x) \circ x = x$

$\text{cod}(x)$ is a right unit: $x \circ \text{cod}(x) = x$

$\text{dom}(\text{dom}(x)) = \text{dom}(x) = \text{cod}(\text{dom}(x))$

$\text{cod}(\text{cod}(x)) = \text{cod}(x) = \text{dom}(\text{cod}(x))$

if $x \circ y$ exists then $\text{dom}(x \circ y) = \text{dom}(x)$ and $\text{cod}(x \circ y) = \text{cod}(y)$

$x \circ y$ exists iff $\text{cod}(x) = \text{dom}(y)$

Remark: The members of C are called *morphisms*, $\circ$ is the partial operation of *composition*, dom is the *domain* and cod is the *codomain* of a morphism.

The set of objects of C is the set $\mathbf{Obj}C = \{\text{dom}(x) | x \in C\}$. For $a, b \in C$ the set of homomorphism from a to b is $\text{Hom}(a, b) = \{c \in C | \text{dom}(c) = a \text{ and } \text{cod}(c) = b\}$.

Morphisms. Let $\mathbf{C}$ and $\mathbf{D}$ be categories. A morphism from $\mathbf{C}$ to $\mathbf{D}$ is a function $h : C \to D$ that is a homomorphism: $h(\text{dom}(c)) = \text{dom}h(c)$ and $h(c \circ d) = h(c) \circ h(d)$ whenever $c \circ d$ is defined.

Basic Results.

Examples.

1. The category of function on sets with composition.

Finite Members. $f(n) =$ number of members of size n.

$f(1) =$	1	$f(6) =$	
$f(2) =$		$f(7) =$	
$f(3) =$		$f(8) =$	
$f(4) =$		$f(9) =$	
$f(5) =$		$f(10) =$	

Subclasses.

... subvariety

... expansion

Superclasses.

... supervariety

... subreduct

Properties. (description)
Feel free to add or delete properties from this list. The list below may contain properties that are not relevant to the class that is being described.

Classtype	(value, see description) [1]
Equational theory	
Quasiequational theory	
First-order theory	
Locally finite	
Residual size	
Congruence distributive	
Congruence modular	
Congruence n-permutable	
Congruence regular	
Congruence uniform	
Congruence extension property	
Definable principal congruences	
Equationally def. pr. cong.	
Amalgamation property	
Strong amalgamation property	
Epimorphisms are surjective	

References

[1] F. Lastname, *Title*, Journal, **1**, 23–45 MRreview