

CHAPTER 1

Introduction

I remind some definitions from volume 1 [5].

I denote a set definition like $\left\{ \frac{x \in A}{P(x)} \right\}$ instead of customary $\{x \in A \mid P(x)\}$ (in order to reduce formulas size).

I denote partial order as \sqsubseteq . I denote lattice operations as \sqcap , \sqcup , \sqcap , \sqcup .

The following generalizes monovalued morphisms in category **Rel**.

Let Hom-sets be complete lattices.

DEFINITION 1955. A morphism f of a partially ordered category is *metamonovalued* when $(\sqcap G) \circ f = \sqcap_{g \in G} (g \circ f)$ whenever G is a set of morphisms with a suitable domain and image.

DEFINITION 1956. A morphism f of a partially ordered category is *metainjective* when $f \circ (\sqcap G) = \sqcap_{g \in G} (f \circ g)$ whenever G is a set of morphisms with a suitable domain and image.

OBVIOUS 1957. Metamonovaluedness and metainjectivity are dual to each other.

DEFINITION 1958. A morphism f of a partially ordered category is *metacomplete* when $f \circ (\sqcup G) = \sqcup_{g \in G} (f \circ g)$ whenever G is a set of morphisms with a suitable domain and image.

DEFINITION 1959. A morphism f of a partially ordered category is *cometacomplete* when $(\sqcup G) \circ f = \sqcup_{g \in G} (g \circ f)$ whenever G is a set of morphisms with a suitable domain and image.

Let now Hom-sets be meet-semilattices.

DEFINITION 1960. A morphism f of a partially ordered category is *weakly metamonovalued* when $(g \sqcap h) \circ f = (g \circ f) \sqcap (h \circ f)$ whenever g and h are morphisms with a suitable domain and image.

DEFINITION 1961. A morphism f of a partially ordered category is *weakly metainjective* when $f \circ (g \sqcap h) = (f \circ g) \sqcap (f \circ h)$ whenever g and h are morphisms with a suitable domain and image.

Let now Hom-sets be join-semilattices.

DEFINITION 1962. A morphism f of a partially ordered category is *weakly metacomplete* when $f \circ (g \sqcup h) = (f \circ g) \sqcup (f \circ h)$ whenever g and h are morphisms with a suitable domain and image.

DEFINITION 1963. A morphism f of a partially ordered category is *weakly cometacomplete* when $(g \sqcup h) \circ f = (g \circ f) \sqcup (h \circ f)$ whenever g and h are morphisms with a suitable domain and image.

OBVIOUS 1964.

1°. Metamonovalued morphisms are weakly metamonovalued.

2°. Metainjective morphisms are weakly metainjective.