

# Monads and their applications

Dr. Daniel Sch  ppi's course lecture notes

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# Introduction



# Chapter 1

## Categorical preliminaries

**Definition 1.0.1** (Categories).

**Definition 1.0.2** (Functors).

**Definition 1.0.3** (Full functors, faithful functor).

**Definition 1.0.4** (Natural transformations).

**Definition 1.0.5** (Representable Functors).

**Definition 1.0.6** (Whiskering).

**Definition 1.0.7** (Horizontal and vertical composition of nat.transf.).

**Definition 1.0.8** (adjunctions).

**Lemma 1.0.9** (Yoneda).

*Proof.*

□

## Chapter 2

# Monads and algebras

**Example 2.0.1.**  $G$  group, a  $G$ -set

**2.1** Monads

**2.2** Algebras

**2.3** Monadic functors

## Chapter 3

# Beck's monadicity theorem

## Chapter 4

# Monads in 2-category theory



## Chapter 5

# Monads in $\infty$ -category theory