Sage Reference Manual

Release 8.0

The Sage Development Team

Jul 23, 2017

CONTENTS

This manual contains documentation for (almost) all of Sage's features, each illustrated with examples that are systematically tested with each release. A thematic index is available below.

CHAPTER

ONE

USER INTERFACE

- Command Line Interface (REPL)
- Web Notebook

CHAPTER

TWO

GRAPHICS

- 2D Graphics
- 3D Graphics

CHAPTER

THREE

MATHEMATICS

3.1 Parents and Categories

- Parents and Elements
- Coercion
- Categories

3.2 Basic Rings and Fields

- Integers and Rational Numbers
- Real and Complex Numbers
- Finite Rings and Fields
- Polynomials
- Formal Power Series
- p-Adic Numbers
- Quaternion Algebras

3.3 Linear Algebra

- Matrices and Spaces of Matrices
- Vectors and Modules
- Tensors on Free Modules of Finite Rank

3.4 Calculus and Analysis

- Symbolic Calculus
- Mathematical Constants
- Elementary and Special Functions
- Asymptotic Expansions

- Numerical Optimization

3.5 Probability and Statistics

- Probability
- Statistics
- Quantitative Finance

3.6 Mathematical Structures

- Sets
- Monoids
- Groups
- Semirings
- Rings
- Algebras

3.7 Discrete Mathematics

- Combinatorics
- Graph Theory
- Quivers
- Matroid Theory
- Discrete Dynamics
- Coding Theory
- Cryptography
- Game Theory
- Symbolic Logic
- SAT solvers

3.8 Geometry and Topology

- Combinatorial and Discrete Geometry
- Hyperbolic Geometry
- Cell Complexes and their Homology
- Differential Forms
- Manifolds

- Parametrized Surfaces
- Knot Theory

3.9 Number Fields and Function Fields

- Number Fields
- Function Fields

3.10 Number Theory

- Diophantine approximation
- Quadratic Forms
- L-Functions
- Arithmetic Subgroups of SL_2(Z)
- General Hecke Algebras and Hecke Modules
- Modular Symbols
- Modular Forms
- Modular Forms for Hecke Triangle Groups
- Modular Abelian Varieties
- Miscellaneous Modular-Form-Related Modules

3.11 Algebraic and Arithmetic Geometry

- Schemes
- Plane, Elliptic and Hyperelliptic Curves

3.12 Miscellaneous

- Databases
- Games

CHAPTER

FOUR

PROGRAMMING

- Data Structures
- Utilities
- Test Framework
- Parallel Computing

4.1 Interfaces

- Interpreter Interfaces
- C/C++ Library Interfaces

CHAPTER

FIVE

GENERAL INFORMATION

- References
- History and License
- genindex
- modindex
- search