
Table of Contents

Preface	xi
1. Primitives	1
Simple Values	1
Booleans	2
Integers	2
Floats	3
Strings	4
Expressions	5
Numeric Operators	5
Logical Operations	7
String Operations	9
Calls	12
Compound Expressions	16
Tips, Traps, and Tracebacks	18
Tips	18
Traps	20
Tracebacks	20
2. Names, Functions, and Modules	21
Assigning Names	23
Defining Functions	24
Function Parameters	27
Comments and Documentation	28
Assertions	30
Default Parameter Values	32
Using Modules	34
Importing	34
Python Files	38
Tips, Traps, and Tracebacks	40
Tips	40

Traps	45
Tracebacks	46
3. Collections	47
Sets	48
Sequences	51
Strings, Bytes, and Bytearrays	53
Ranges	60
Tuples	61
Lists	62
Mappings	66
Dictionaries	67
Streams	72
Files	73
Generators	78
Collection-Related Expression Features	79
Comprehensions	79
Functional Parameters	89
Tips, Traps, and Tracebacks	94
Tips	94
Traps	96
Tracebacks	97
4. Control Statements	99
Conditionals	101
Loops	104
Simple Loop Examples	105
Initialization of Loop Values	106
Looping Forever	107
Loops with Guard Conditions	109
Iterations	111
Iteration Statements	111
Kinds of Iterations	113
Exception Handlers	134
Python Errors	136
Exception Handling Statements	138
Raising Exceptions	141
Extended Examples	143
Extracting Information from an HTML File	143
The Grand Unified Bioinformatics File Parser	146
Parsing GenBank Files	148
Translating RNA Sequences	151
Constructing a Table from a Text File	155

Tips, Traps, and Tracebacks	160
Tips	160
Traps	162
Tracebacks	163
5. Classes	165
Defining Classes	166
Instance Attributes	168
Class Attributes	179
Class and Method Relationships	186
Decomposition	186
Inheritance	194
Tips, Traps, and Tracebacks	205
Tips	205
Traps	207
Tracebacks	208
6. Utilities	209
System Environment	209
Dates and Times: datetime	209
System Information	212
Command-Line Utilities	217
Communications	223
The Filesystem	226
Operating System Interface: os	226
Manipulating Paths: os.path	229
Filename Expansion: fnmatch and glob	232
Shell Utilities: shutil	234
Comparing Files and Directories	235
Working with Text	238
Formatting Blocks of Text: textwrap	238
String Utilities: string	240
Comma- and Tab-Separated Formats: csv	241
String-Based Reading and Writing: io	242
Persistent Storage	243
Persistent Text: dbm	243
Persistent Objects: pickle	247
Keyed Persistent Object Storage: shelve	248
Debugging Tools	249
Tips, Traps, and Tracebacks	253
Tips	253
Traps	254
Tracebacks	255

7. Pattern Matching	257
Fundamental Syntax	258
Fixed-Length Matching	259
Variable-Length Matching	262
Greedy Versus Nongreedy Matching	263
Grouping and Disjunction	264
The Actions of the re Module	265
Functions	265
Flags	266
Methods	268
Results of re Functions and Methods	269
Match Object Fields	269
Match Object Methods	269
Putting It All Together: Examples	270
Some Quick Examples	270
Extracting Descriptions from Sequence Files	272
Extracting Entries From Sequence Files	274
Tips, Traps, and Tracebacks	283
Tips	283
Traps	284
Tracebacks	285
 8. Structured Text	 287
HTML	287
Simple HTML Processing	289
Structured HTML Processing	297
XML	300
The Nature of XML	300
An XML File for a Complete Genome	302
The ElementTree Module	303
Event-Based Processing	310
expat	317
Tips, Traps, and Tracebacks	322
Tips	322
Traps	323
Tracebacks	323
 9. Web Programming	 325
Manipulating URLs: urllib.parse	325
Disassembling URLs	326
Assembling URLs	327
Opening Web Pages: webbrowser	328
Module Functions	328

Constructing and Submitting Queries	329
Constructing and Viewing an HTML Page	330
Web Clients	331
Making the URLs in a Response Absolute	332
Constructing an HTML Page of Extracted Links	333
Downloading a Web Page's Linked Files	334
Web Servers	337
Sockets and Servers	337
CGI	343
Simple Web Applications	348
Tips, Traps, and Tracebacks	354
Tips	355
Traps	357
Tracebacks	358
10. Relational Databases	359
Representation in Relational Databases	360
Database Tables	360
A Restriction Enzyme Database	365
Using Relational Data	370
SQL Basics	371
SQL Queries	380
Querying the Database from a Web Page	392
Tips, Traps, and Tracebacks	395
Tips	395
Traps	398
Tracebacks	398
11. Structured Graphics	399
Introduction to Graphics Programming	399
Concepts	400
GUI Toolkits	404
Structured Graphics with tkinter	406
tkinter Fundamentals	406
Examples	411
Structured Graphics with SVG	431
SVG File Contents	432
Examples	436
Tips, Traps, and Tracebacks	444
Tips	444
Traps	445
Tracebacks	447

A. Python Language Summary	449
B. Collection Type Summary	459
Index	473