Contents

Preface **1**

Acknowledgements **3**

1 Introduction **5**

1.1 What is Python? 5
1.2 Compiled vs Interpreted 6
1.3 Object-Oriented Programming 7
1.4 High-level Programming Language 8
1.5 Static vs Dynamic Semantics 9
1.6 Installing Python 12
1.7 How Do You Interact with Python? 14
1.7.1 Spyder 15
1.7.2 Jupyter Notebook 15
1.7.3 PyCharm 17
1.7.4 An outsider: iPython 18

2 First Steps With Python **21**

2.1 The Logic Behind A Code 21
2.2 Objects in Python 22
2.3 Object Types 24
2.3.1 Integers 24
2.3.2 Floats 26

2.3.3 Strings 27
2.3.4 Formal String-Number Concatenation 31
2.3.5 Boolean 33
2.4 Commenting the Code 34
2.5 Reserved Keywords 36
2.6 Exercises 36
2.7 Read the Code 37
2.8 Code Bloopers 38
2.9 Solutions to Exercises 38

3 Tuples, Lists, Sets, and Dictionaries 41
3.1 Tuples 41
3.1.1 Slicing Tuples 43
3.1.2 Assigning and Chaining Tuples 45
3.2 Lists 46
3.2.1 Updating a List 47
3.2.2 Deleting a List Element 49
3.2.3 Slicing Lists 49
3.3 Indexing 50
3.4 Exercises on Lists 52
3.5 Python Methods 53
3.5.1 Methods for Lists 55
3.5.2 Exercise on Methods 60
3.5.3 The `zip()` function 60
3.6 Sets 60
3.6.1 How to Create a Set 61
3.6.2 Methods for Sets 62
3.6.3 Exercises on Sets 67
3.7 Dictionaries 67
3.7.1 How to Create a Dictionary 67
3.7.2 Casting and Recasting Objects 68

3.7.3 Retrieving a Value 70
3.7.4 Setting Values 70
3.7.5 Multi-level dictionaries 70
3.7.6 Exercises on Dictionaries 71
3.8 Solution to Exercises 71
3.8.1 Solutions to Exercises on Lists 71
3.8.2 Solutions to Exercises on Methods 76
3.8.3 Solutions to Exercises on Sets 76
3.8.4 Solutions to Exercises on Dictionaries 77

4 Conditional Statements and Loops 79
4.1 Indentation 80
4.2 `if` Statements 80
4.3 `else` Statements 83
4.4 `elif` Statements 84
4.4.1 Condition Check 85
4.5 The `for` Loop 85
4.5.1 For Loops On Determined Iterables 88
4.5.2 `for` Loops Over Iterators 92
4.5.3 Creating Lists Through `for` Loops 92
4.5.4 Iteration Over Multiple Lists 93
4.5.5 Exercises on `for` Loops Over Lists 94
4.5.6 `for` Loops Over Dictionaries: Details 95
4.5.7 `for` Loops With Multi-Level Dictionaries 97
4.5.8 Exercises on `for` Loops Over Dictionaries 98
4.6 `while` Loops 99
4.6.1 Exercises on `while` Loops 101
4.7 List Comprehension 102
4.8 An Alternative to `for` Loops 104
4.9 Read the Code 107
4.10 Solutions to Exercises 108

4.10.1 Solutions to Exercises on `for` Loops Over Lists . 108
4.10.2 Solutions to Exercises on `for` Loops Over Dictionaries 113
4.10.3 Solutions to Exercises on `while` Loops 113

5 Functions 115
5.1 Writing a Function in Python 116
5.1.1 Default Parameters 117
5.1.2 Functions With 2 Arguments 118
5.1.3 The Parameter `*args` 118
5.1.4 The Parameter `**kwargs` 120
5.1.5 Formal Order of Parameters 121
5.2 Functions Calling Functions 122
5.2.1 Logical Flow of the Problem 123
5.3 Exercises on Functions 125
5.4 Read the Code 126
5.5 Code Bloopers 126
5.6 Useful Built-in Functions 128
5.6.1 `lambda` Functions 128
5.6.2 `map()` Function 130
5.6.3 `filter()` Function 131
5.7 Solutions to Code Bloopers 132
5.8 Solutions to Exercises on Functions 133

6 Object Oriented Programming and Classes 137
6.1 Object Oriented Programming 137
6.2 Classes 140
6.2.1 Writing a Class in Python 140
6.2.2 The Special Method `__init__()` 142
6.2.3 Adding More Methods 143
6.2.4 Creating and Using a Class 144
6.2.5 Class Inheritance 147

7 Python Modules: `pandas` 153
7.1 Installing and Importing a Module 153
7.2 Managing Databases With Pandas 154
7.2.1 Import External Files as Data Frames 155
7.3 Indexing 158
7.3.1 Columns 158
7.3.2 Rows 166
7.4 Adding new columns 167
7.5 Working with dates 171
7.6 Grouping 172
7.7 Exercises on Pandas 174
7.8 Solutions to Exercises on Pandas 174