

Contents

Foreword	v
Preface	xxi
Book Outline	xxiii
Acknowledgements	xxv

I Basics	1
1 Introduction to L^AT_EX	3
1.1 Pros and Cons	4
1.2 Basics	6
1.2.1 The T _E X Processors	6
1.2.2 From tex to dvi and Friends	6
1.2.3 The Name of the Game	8
1.2.4 Staying in Sync	8
1.2.5 Writing a L ^A T _E X Input Document	8
1.2.6 The Abstract	11
1.2.7 Spaces, Comments, and Paragraphs	12
1.3 Document Hierarchy	12
1.3.1 Minor Document Divisions	13
1.3.2 Major Document Divisions	14
1.3.3 The Appendix	15
1.4 Document Management	15
1.5 Labels and Cross-references	16
1.6 Controlling the Style of References	18
1.7 The Bibliography	19
1.7.1 The bibtex Program	23
1.7.2 The biblatex Package	25
1.7.3 End-of-Chapter Bibliographies	27
1.7.4 Classified Bibliographies	28
1.8 Table of Contents and Lists of Things	29
1.8.1 Controlling the Table of Contents	30
1.8.2 Controlling the Sectional Unit Numbering	30
1.8.3 Indexes and Glossaries	30
1.9 Class Files	32

1.10	Packages	34
1.11	Useful Classes and Packages	35
1.12	Errors and Troubleshooting	35
 II Basic Typesetting		 39
2	Running Text	41
2.1	Special Characters	41
2.1.1	Tieing Text	41
2.1.2	Grouping	43
2.2	Diacritics	44
2.3	Ligatures	44
2.4	Quotation Marks	45
2.5	Dashes	46
2.6	Full Stops	46
2.7	Ellipsis	47
2.8	Emphasis	48
2.9	Borderline Punctuation	48
2.10	Footnotes and Marginal Notes	48
2.11	Displayed Quotations and Verses	49
2.12	Line Breaks	49
2.13	Controlling the Size	50
2.14	Seriffed and Sans Serif Typefaces	51
2.15	Small Caps Letters	52
2.16	Controlling the Type Style	53
2.17	Abbreviations	53
2.17.1	Initialisms	53
2.17.2	Acronyms	54
2.17.3	Shortenings	54
2.17.4	Introducing Abbreviations	55
2.17.5	British and American Spelling	55
2.17.6	Latin Abbreviations	56
2.17.7	Units	56
2.18	Phantom Text	57
2.19	Alignment	58
2.19.1	Centred Text	58
2.19.2	Flushed/Ragged Text	58
2.19.3	Basic tabular Constructs	58
2.19.4	The booktabs Package	61
2.19.5	Advanced tabular Constructs	61
2.19.6	The tabbing Environment	63
2.20	Language Related Issues	65
2.20.1	Hyphenation	65
2.20.2	Foreign Languages	65
2.20.3	Spell-Checking	66
3	Lists	67
3.1	Unordered Lists	67

3.2	Ordered Lists	68
3.3	The enumerate Package	69
3.4	Description Lists	69
3.5	Making your Own Lists	70
III Tables, Diagrams, and Data Plots		73
4	Presenting External Pictures	75
4.1	The figure Environment	75
4.2	Special Packages	76
4.2.1	Floats	76
4.2.2	Legends	77
4.3	External Picture Files	77
4.4	The graphicx Package	77
4.5	Setting Default Key Values	78
4.6	Setting a Search Path	79
4.7	Graphics Extensions	79
5	Presenting Diagrams	81
5.1	Why Specify your Diagrams?	81
5.2	The tikzpicture Environment	82
5.3	The \tikz Command	82
5.4	Grids	83
5.5	Paths	83
5.6	Coordinate Labels	84
5.7	Extending Paths	85
5.8	Actions on Paths	88
5.8.1	Colour	89
5.8.2	Drawing the Path	91
5.8.3	Line Width	91
5.8.4	Dash Patterns	91
5.8.5	Predefined Styles	92
5.8.6	Line Cap and Join	92
5.8.7	Arrows	93
5.8.8	Filling a Path	94
5.8.9	Path Filling Rules	95
5.9	Nodes and Node Labels	96
5.9.1	Predefined Nodes Shapes	97
5.9.2	Node Options	98
5.9.3	Connecting Nodes	99
5.9.4	Special Node Shapes	100
5.10	The spy Library	101
5.11	Trees	101
5.12	Logic Circuits	103
5.13	Commutative Diagrams	104
5.14	Coordinate Systems	105
5.15	Coordinate Calculations	108
5.15.1	Relative and Incremental Coordinates	108

5.15.2	Complex Coordinate Calculations	109
5.16	Options	111
5.17	Styles	111
5.18	Scopes	112
5.19	The \foreach Command	113
5.20	The let Operation	114
5.21	The To Path Operation	115
6	Presenting Data in Tables	117
6.1	Why Use Tables?	117
6.2	Table Taxonomy	117
6.3	Table Anatomy	118
6.4	Table Design	119
6.5	Aligning Columns with Numbers	121
6.5.1	Aligning Columns by Hand	122
6.5.2	The dcolumn Package	123
6.5.3	The siunitx Package	124
6.6	The table Environment	124
6.7	Wide Tables	125
6.8	Multi-page Tables	125
6.9	Databases and Spreadsheets	126
7	Presenting Data with Plots	129
7.1	The Purpose of Data Plots	129
7.2	Pie Charts	129
7.3	Introduction to pgfplots	131
7.4	Bar Graphs	132
7.5	Paired Bar Graphs	134
7.6	Component Bar Graphs	135
7.7	Coordinate Systems	136
7.8	Line Graphs	137
7.9	Scatter Plots	139
IV	Mathematics and Algorithms	143
8	Mathematics	145
8.1	The $\mathcal{A}\mathcal{M}\mathcal{S}$ - \LaTeX Platform	145
8.2	\LaTeX 's Math Modes	146
8.3	Ordinary Math Mode	146
8.4	Subscripts and Superscripts	147
8.5	Greek Letters	147
8.6	Display Math Mode	149
8.6.1	The equation Environment	149
8.6.2	The split Environment	150
8.6.3	The gather Environment	151
8.6.4	The align Environment	151
8.6.5	Interrupting a Display	153
8.6.6	Low-level Alignment Building Blocks	153
8.6.7	The eqnarray Environment	154

8.7	Text in Formulae	154
8.8	Delimiters	154
8.8.1	Scaling Left and Right Delimiters	155
8.8.2	Bars	156
8.8.3	Tuples	157
8.8.4	Floors and Ceilings	157
8.8.5	Delimiter Commands	158
8.9	Fractions	158
8.10	Sums, Products, and Friends	159
8.10.1	Basic Typesetting Commands	159
8.10.2	Overriding Text and Display Style	160
8.10.3	Multi-line Limits	160
8.11	Existing Functions and Operators	161
8.12	Integration and Differentiation	162
8.12.1	Integration	162
8.12.2	Differentiation	163
8.13	Roots	164
8.14	Changing the Style	164
8.15	Symbol Tables	165
8.15.1	Operator Symbols	165
8.15.2	Relation Symbols	165
8.15.3	Arrows	166
8.15.4	Miscellaneous Symbols	166
9	Advanced Mathematics	169
9.1	Declaring New Operators	169
9.2	Managing Content with the cool Package	170
9.3	Arrays and Matrices	170
9.4	Accents, Hats, and Other Decorations	171
9.5	Braces	172
9.6	Case-based Definitions	172
9.7	Function Definitions	173
9.8	Theorems	174
9.8.1	Theorem Taxonomy	174
9.8.2	Styles for Theorem-like Environments	175
9.8.3	Defining Theorem-like Environments	175
9.8.4	Defining Theorem-like Styles	177
9.8.5	Proofs	177
9.9	Mathematical Punctuation	178
9.10	Spacing and Linebreaks	179
9.10.1	Line Breaks	179
9.10.2	Conditions	180
9.10.3	Physical Units	181
9.10.4	Sets	181
9.10.5	More Spacing Commands	182
10	Algorithms and Listings	183
10.1	Presenting Pseudo-Code with algorithm2e	183
10.1.1	Loading algorithm2e	183

- 10.1.2 Basic Environments 184
 - 10.1.3 Describing Input and Output 185
 - 10.1.4 Conditional Statements 185
 - 10.1.5 The Switch Statement 187
 - 10.1.6 Iterative Statements 188
 - 10.1.7 Comments 189
- 10.2 The listings Package 190

V Automation 193

11 Commands and Environments 195

- 11.1 Some Terminology 195
- 11.2 Advantages and Disadvantages 195
- 11.3 User-defined Commands 197
 - 11.3.1 Defining Commands Without Parameters . . . 197
 - 11.3.2 Defining Commands With Parameters 198
 - 11.3.3 Fragile and Robust Commands 199
 - 11.3.4 Defining Robust Commands 200
- 11.4 Commands and Parameters 200
- 11.5 Defining Commands with TeX 202
- 11.6 Tweaking Existing Commands with \let 206
- 11.7 Using More than Nine Parameters 206
- 11.8 Using Environments 207

12 Branching 209

- 12.1 Counters, Switches, and Lengths 209
 - 12.1.1 Counters 209
 - 12.1.2 Switches 210
 - 12.1.3 Lengths 211
 - 12.1.4 Scoping 213
- 12.2 The ifthen Package 213
- 12.3 The calc Package 215
- 12.4 Looping 215
- 12.5 Tail Recursion 216

13 Option Parsing 217

- 13.1 What is a <Key>=<Value> Interface? 217
- 13.2 Why Use a <Key>=<Value> Interface? 218
- 13.3 The pgfkeys Package 218
- 13.4 Providing and Using the Values 218
- 13.5 Traversing the Key Tree 219
- 13.6 Executing Keys 220
- 13.7 Error Handling 220
- 13.8 Storing Values in Macros 221
- 13.9 Decisions 221
- 13.10 Choice Keys 222

VI	Miscellany	223
14	Beamer Presentations	225
14.1	Frames	225
14.2	Modal Presentations	227
14.3	Incremental Presentations	229
14.4	Visual Alerts	231
14.5	Adding Some Style	231
15	Writing Classes and Packages	237
15.1	The Structure of Classes and Packages	237
15.2	Dependencies	237
15.3	Identification	238
15.4	Defining and Parsing the Options	238
15.5	Loading Existing Classes and Packages	239
15.6	Final Configuration	240
16	Using OpenType Fonts	243
16.1	OpenType Font Features	244
16.2	L ^A T _E X Font Selection Mechanism	246
16.3	Overview of Functionality	249
16.4	Inspecting the Font	250
16.5	Current Alternatives	252
16.6	Designing the Font Families	252
16.7	Extracting the Fonts	253
16.8	Font Definition Files	255
16.9	Creating the Font Definition Files	256
16.10	Implementing a Font Package	257
16.10.1	Parsing the Point Size	257
16.10.2	Loading the Font	260
16.10.3	Changing the Features	261
16.11	Using the Fonts	263
VII	References and Bibliography	265
	Typographic Jargon	267
	Bibliography	273
	Acronyms and Abbreviations	279
	Indexes	281
	L ^A T _E X and T _E X Commands	283
	Environments	293
	Classes	295
	Packages	297
	Languages and External Commands	299