

# Contents

<b>List of Figures</b>	<b>xix</b>
<b>List of Tables</b>	<b>xxi</b>
<b>Preface</b>	<b>xxv</b>
<b>1 Introduction</b>	<b>1</b>
1.1 A brief history . . . . .	1
1.2 Today's system . . . . .	6
1.3 Working with this book . . . . .	10
1.3.1 What's here . . . . .	10
1.3.2 Typographic conventions . . . . .	11
1.3.3 Using the examples . . . . .	14
<b>2 The Structure of a L<sup>A</sup>T<sub>E</sub>X Document</b>	<b>15</b>
2.1 The structure of a source file . . . . .	15
2.1.1 Processing of options and packages . . . . .	17
2.1.2 Splitting the source file into parts . . . . .	18
2.1.3 Combining several files . . . . .	20
2.1.4 optional—Providing variants in the document source . . . . .	21
2.2 Sectioning commands . . . . .	22
2.2.1 Numbering headings . . . . .	24
2.2.2 Formatting headings . . . . .	27
2.2.3 Changing fixed heading texts . . . . .	34
2.2.4 <code>fncychap</code> —Predefined chapter heading layouts . . . . .	34
2.2.5 <code>quotchap</code> —Mottos on chapters . . . . .	35
2.2.6 <code>titlesec</code> —A different approach to headings . . . . .	36

2.3	Table of contents structures . . . . .	45
2.3.1	Entering information into the contents files . . . . .	46
2.3.2	Typesetting a contents list . . . . .	49
2.3.3	Combining contents lists . . . . .	52
2.3.4	Providing additional contents files . . . . .	54
2.3.5	<i>shorttoc</i> —Summary table of contents . . . . .	55
2.3.6	<i>minitoc</i> —Multiple tables of contents . . . . .	56
2.3.7	<i>titletoc</i> —A different approach to contents lists . . . . .	58
2.4	Managing references . . . . .	66
2.4.1	<i>showkeys</i> —Displaying the reference keys . . . . .	68
2.4.2	<i>varioref</i> —More flexible cross-references . . . . .	68
2.4.3	<i>prettyref</i> —Adding frills to references . . . . .	75
2.4.4	<i>titleref</i> —Non-numerical references . . . . .	76
2.4.5	<i>hyperref</i> —Active references . . . . .	78
2.4.6	<i>xr</i> —References to external documents . . . . .	78
3	<b>Basic Formatting Tools</b>	79
3.1	Phrases and paragraphs . . . . .	80
3.1.1	<i>xspace</i> —Gentle spacing after a macro . . . . .	80
3.1.2	<i>ellipsis, lips</i> —Marks of omission . . . . .	81
3.1.3	<i>amsmath</i> —Nonbreaking dashes . . . . .	83
3.1.4	<i>relsize</i> —Relative changes to the font size . . . . .	83
3.1.5	<i>textcase</i> —Change case of text intelligently . . . . .	85
3.1.6	<i>ulem</i> —Emphasize via underline . . . . .	87
3.1.7	<i>soul</i> —Letterspacing or stealing sheep . . . . .	88
3.1.8	<i>url</i> —Typesetting URLs, path names, and the like . . . . .	93
3.1.9	<i>euro</i> —Converting and typesetting currencies . . . . .	96
3.1.10	<i>lettrine</i> —Dropping your capital . . . . .	99
3.1.11	Paragraph justification in L <sup>A</sup> T <sub>E</sub> X . . . . .	102
3.1.12	<i>ragged2e</i> —Enhancing justification . . . . .	105
3.1.13	<i>setspace</i> —Changing interline spacing . . . . .	106
3.1.14	<i>picinpar</i> —Making rectangular holes . . . . .	108
3.2	Footnotes, endnotes, and marginals . . . . .	109
3.2.1	Using standard footnotes . . . . .	110
3.2.2	Customizing standard footnotes . . . . .	112
3.2.3	<i>ftnright</i> —Right footnotes in a two-column environment . . . . .	114
3.2.4	<i>footmisc</i> —Various footnotes styles . . . . .	114
3.2.5	<i>perpage</i> —Resetting counters on a “per-page” basis . . . . .	120
3.2.6	<i>manyfoot</i> —Independent footnotes . . . . .	122
3.2.7	<i>endnotes</i> —An alternative to footnotes . . . . .	125
3.2.8	Marginal notes . . . . .	126
3.3	List structures . . . . .	128
3.3.1	Modifying the standard lists . . . . .	128
3.3.2	<i>paralist</i> —Extended list environments . . . . .	132

3.3.3	<i>amsthm</i> —Providing headed lists . . . . .	138
3.3.4	Making your own lists . . . . .	144
3.4	Simulating typed text . . . . .	151
3.4.1	Simple verbatim extensions . . . . .	152
3.4.2	<i>upquote</i> —Computer program style quoting . . . . .	153
3.4.3	<i>fancyvrb</i> —Highly customizable verbatim environments . .	155
3.4.4	<i>listings</i> —Pretty-printing program code . . . . .	168
3.5	Lines and columns . . . . .	175
3.5.1	<i>lineno</i> —Numbering lines of text . . . . .	176
3.5.2	<i>parallel</i> —Two text streams aligned . . . . .	181
3.5.3	<i>multicol</i> —A flexible way to handle multiple columns . .	184
3.5.4	<i>changebar</i> —Adding revision bars to documents . . . . .	189
4	<b>The Layout of the Page</b>	193
4.1	Geometrical dimensions of the layout . . . . .	193
4.2	Changing the layout . . . . .	197
4.2.1	<i>layouts</i> —Displaying your layout . . . . .	199
4.2.2	A collection of page layout packages . . . . .	202
4.2.3	<i>typearea</i> —A traditional approach . . . . .	203
4.2.4	<i>geometry</i> —Layout specification with auto-completion . .	206
4.2.5	<i>lscape</i> —Typesetting individual pages in landscape mode .	211
4.2.6	<i>crop</i> —Producing trimming marks . . . . .	212
4.3	Dynamic page data: page numbers and marks . . . . .	215
4.3.1	<i>L<small>A</small>T<small>E</small>X</i> page numbers . . . . .	215
4.3.2	<i>lastpage</i> —A way to reference it . . . . .	216
4.3.3	<i>chappg</i> —Page numbers by chapters . . . . .	216
4.3.4	<i>L<small>A</small>T<small>E</small>X</i> mark commands . . . . .	217
4.3.5	<i>extramarks</i> —Providing new marks . . . . .	220
4.4	Page styles . . . . .	221
4.4.1	The low-level page style interface . . . . .	223
4.4.2	<i>fancyhdr</i> —Customizing page styles . . . . .	224
4.4.3	<i>truncate</i> —Truncate text to a given length . . . . .	232
4.5	Visual formatting . . . . .	234
4.5.1	<i>nextpage</i> —Extensions to <i>\clearpage</i> . . . . .	235
4.6	Doing layout with class . . . . .	236
4.6.1	<i>KOMA-Script</i> —A drop-in replacement for <i>article</i> et al. . .	236
4.6.2	<i>memoir</i> —Producing complex publications . . . . .	237
5	<b>Tabular Material</b>	239
5.1	Standard <i>L<small>A</small>T<small>E</small>X</i> environments . . . . .	240
5.1.1	Using the <i>tabbing</i> environment . . . . .	241
5.1.2	Using the <i>tabular</i> environment . . . . .	242
5.2	<i>array</i> —Extending the tabular environments . . . . .	243
5.2.1	Examples of preamble commands . . . . .	244

5.3	5.2.2 Defining new column specifiers . . . . .	248
	Calculating column widths . . . . .	249
	5.3.1 Explicit calculation of column widths . . . . .	250
	5.3.2 <i>tabularx</i> —Automatic calculation of column widths . . . . .	251
	5.3.3 <i>tabulary</i> —Column widths based on content . . . . .	253
	5.3.4 Differences between <i>tabular*</i> , <i>tabularx</i> , and <i>tabulary</i> . . . . .	255
5.4	Multipage tabular material . . . . .	255
	5.4.1 <i>supertabular</i> —Making multipage tabulars . . . . .	256
	5.4.2 <i>longtable</i> —Alternative multipage tabulars . . . . .	259
5.5	Color in tables . . . . .	264
5.6	Customizing table rules and spacing . . . . .	265
	5.6.1 Colored table rules . . . . .	265
	5.6.2 Variable-width rules . . . . .	266
	5.6.3 <i>hhline</i> —Combining horizontal and vertical lines . . . . .	266
	5.6.4 <i>arydshln</i> —Dashed rules . . . . .	267
	5.6.5 <i>tbls</i> —Controlling row spacing . . . . .	269
	5.6.6 <i>booktabs</i> —Formal ruled tables . . . . .	269
5.7	Further extensions . . . . .	272
	5.7.1 <i>multirow</i> —Vertical alignment in tables . . . . .	273
	5.7.2 <i>dcolumn</i> —Decimal column alignments . . . . .	274
5.8	Footnotes in tabular material . . . . .	277
	5.8.1 Using <i>minipage</i> footnotes with tables . . . . .	277
	5.8.2 <i>threeparttable</i> —Setting table and notes together . . . . .	278
5.9	Applications . . . . .	279
	5.9.1 Managing tables with wide entries . . . . .	279
	5.9.2 Tables inside tables . . . . .	280
6	<b>Mastering Floats</b>	283
6.1	Understanding float parameters . . . . .	284
6.2	Float placement control . . . . .	286
	6.2.1 <i>placeins</i> —Preventing floats from crossing a barrier . . . . .	288
	6.2.2 <i>afterpage</i> —Taking control at the page boundary . . . . .	289
	6.2.3 <i>endfloat</i> —Placing figures and tables at the end . . . . .	289
6.3	Extensions to L <sup>A</sup> T <sub>E</sub> X's float concept . . . . .	291
	6.3.1 <i>float</i> —Creating new float types . . . . .	291
	6.3.2 <i>caption</i> —For nonfloating figures and tables . . . . .	295
	6.3.3 <i>rotating</i> —Rotating floats . . . . .	296
	6.3.4 <i>rotfloat</i> —Combining float and rotating . . . . .	298
6.4	Inline floats . . . . .	298
	6.4.1 <i>wrapfig</i> —Wrapping text around a figure . . . . .	299
	6.4.2 <i>picins</i> —Placing pictures inside the text . . . . .	302
6.5	Controlling the float caption . . . . .	306
	6.5.1 <i>caption</i> —Customizing your captions . . . . .	308
	6.5.2 <i>subfig</i> —Substructuring floats . . . . .	315

6.5.3	<code>subfloat</code> —Sub-numbering floats . . . . .	321
6.5.4	<code>sidecap</code> —Place captions sideways . . . . .	323
6.5.5	<code>fltpage</code> —Captions on a separate page . . . . .	325
<b>7</b>	<b>Fonts and Encodings</b>	<b>327</b>
7.1	Introduction . . . . .	327
7.1.1	The history of L <sup>A</sup> T <sub>E</sub> X's font selection scheme (NFSS) . . . . .	327
7.1.2	Input and output encodings . . . . .	329
7.2	Understanding font characteristics . . . . .	331
7.2.1	Monospaced and proportional fonts . . . . .	331
7.2.2	Serifed and sans serif fonts . . . . .	332
7.2.3	Font families and their attributes . . . . .	333
7.2.4	Font encodings . . . . .	336
7.3	Using fonts in text . . . . .	337
7.3.1	Standard L <sup>A</sup> T <sub>E</sub> X font commands . . . . .	338
7.3.2	Combining standard font commands . . . . .	343
7.3.3	Font commands versus declarations . . . . .	344
7.3.4	Accessing all characters of a font . . . . .	345
7.3.5	Changing the default text fonts . . . . .	346
7.3.6	L <sup>A</sup> T <sub>E</sub> X 2.09 font commands . . . . .	347
7.4	Using fonts in math . . . . .	347
7.4.1	Special math alphabet identifiers . . . . .	348
7.4.2	Text font commands in math . . . . .	351
7.4.3	Mathematical formula versions . . . . .	352
7.5	Standard L <sup>A</sup> T <sub>E</sub> X font support . . . . .	353
7.5.1	Computer Modern—The L <sup>A</sup> T <sub>E</sub> X standard fonts . . . . .	353
7.5.2	<code>inputenc</code> —Selecting the input encoding . . . . .	357
7.5.3	<code>fontenc</code> —Selecting font encodings . . . . .	361
7.5.4	<code>textcomp</code> —Providing additional text symbols . . . . .	362
7.5.5	<code>exscale</code> —Scaling large operators . . . . .	368
7.5.6	<code>tracefnt</code> —Tracing the font selection . . . . .	368
7.5.7	<code>nfssfont.tex</code> —Displaying font tables and samples . . . . .	369
7.6	PSNFSS—PostScript fonts with L <sup>A</sup> T <sub>E</sub> X . . . . .	370
7.6.1	Font samples for fonts supported by PSNFSS . . . . .	373
7.6.2	<code>mathptmx</code> —Times Roman in math and text . . . . .	376
7.6.3	<code>mathpazo</code> —Palatino in math and text . . . . .	377
7.6.4	<code>pifont</code> —Accessing Pi and Symbol fonts . . . . .	378
7.7	A collection of font packages . . . . .	381
7.7.1	<code>eco</code> —Old-style numerals with Computer Modern . . . . .	381
7.7.2	<code>ccfonts</code> , <code>concmath</code> —The Concrete fonts . . . . .	383
7.7.3	<code>cmbright</code> —The Computer Modern Bright fonts . . . . .	385
7.7.4	<code>luximono</code> —A general-purpose typewriter font . . . . .	386
7.7.5	<code>txfonts</code> —Alternative support for Times Roman . . . . .	388
7.7.6	<code>pxfonts</code> —Alternative support for Palatino . . . . .	390

7.7.7	The Fourier-GUTenberg fonts . . . . .	391
7.7.8	The URW Antiqua and Grotesk fonts . . . . .	393
7.7.9	yfonts—Typesetting with Old German fonts . . . . .	394
7.7.10	euler, eulervm—Accessing the Euler fonts . . . . .	396
7.8	The L <sup>A</sup> T <sub>E</sub> X world of symbols . . . . .	399
7.8.1	dingbat—A selection of hands . . . . .	400
7.8.2	wasysym—Waldi's symbol font . . . . .	401
7.8.3	marvosym—Interface to the MarVoSym font . . . . .	401
7.8.4	bding—A METAFONT alternative to Zapf Dingbats . . . . .	403
7.8.5	ifsym—Clocks, clouds, mountains, and other symbols . . . . .	403
7.8.6	tipa—International Phonetic Alphabet symbols . . . . .	405
7.8.7	Typesetting the euro symbol (€) . . . . .	407
7.9	The low-level interface . . . . .	412
7.9.1	Setting individual font attributes . . . . .	413
7.9.2	Setting several font attributes . . . . .	417
7.9.3	Automatic substitution of fonts . . . . .	418
7.9.4	Using low-level commands in the document . . . . .	418
7.10	Setting up new fonts . . . . .	419
7.10.1	Overview . . . . .	419
7.10.2	Naming those thousands of fonts . . . . .	420
7.10.3	Declaring new font families and font shape groups . . . . .	421
7.10.4	Modifying font families and font shape groups . . . . .	429
7.10.5	Declaring new font encoding schemes . . . . .	430
7.10.6	Internal file organization . . . . .	431
7.10.7	Declaring new fonts for use in math . . . . .	432
7.10.8	Example: Defining your own .fd files . . . . .	437
7.10.9	The order of declaration . . . . .	439
7.11	L <sup>A</sup> T <sub>E</sub> X's encoding models . . . . .	440
7.11.1	Character data within the L <sup>A</sup> T <sub>E</sub> X system . . . . .	440
7.11.2	L <sup>A</sup> T <sub>E</sub> X's internal character representation (LICR) . . . . .	442
7.11.3	Input encodings . . . . .	443
7.11.4	Output encodings . . . . .	447
7.12	Compatibility packages for very old documents . . . . .	463
7.12.1	oldlfont, rawfonts, newlfont—Processing old documents . . . . .	463
7.12.2	latexsym—Providing symbols from L <sup>A</sup> T <sub>E</sub> X 2.09 lasy fonts . . . . .	464
8	<b>Higher Mathematics</b> . . . . .	465
8.1	Introduction to A <sub>M</sub> S-L <sup>A</sup> T <sub>E</sub> X . . . . .	466
8.2	Display and alignment structures for equations . . . . .	468
8.2.1	Comparison with standard L <sup>A</sup> T <sub>E</sub> X . . . . .	470
8.2.2	A single equation on one line . . . . .	471
8.2.3	A single equation on several lines: no alignment . . . . .	471
8.2.4	A single equation on several lines: with alignment . . . . .	473
8.2.5	Equation groups without alignment . . . . .	474

8.2.6	Equation groups with simple alignment . . . . .	475
8.2.7	Multiple alignments: <code>align</code> and <code>flalign</code> . . . . .	475
8.2.8	Display environments as mini-pages . . . . .	477
8.2.9	Interrupting displays: <code>\intertext</code> . . . . .	479
8.2.10	Vertical space and page breaks in and around displays . . . . .	479
8.2.11	Equation numbering and tags . . . . .	482
8.2.12	Fine-tuning tag placement . . . . .	483
8.2.13	Subordinate numbering sequences . . . . .	484
8.2.14	Resetting the equation counter . . . . .	485
8.3	Matrix-like environments . . . . .	485
8.3.1	The <code>cases</code> environment . . . . .	486
8.3.2	The matrix environments . . . . .	486
8.3.3	Stacking in subscripts and superscripts . . . . .	487
8.3.4	Commutative diagrams . . . . .	488
8.3.5	<code>delarray</code> —Delimiters surrounding an array . . . . .	489
8.4	Compound structures and decorations . . . . .	490
8.4.1	Decorated arrows . . . . .	490
8.4.2	Continued fractions . . . . .	490
8.4.3	Boxed formulas . . . . .	491
8.4.4	Limiting positions . . . . .	491
8.4.5	Multiple integral signs . . . . .	492
8.4.6	Modular relations . . . . .	492
8.4.7	Fractions and generalizations . . . . .	493
8.4.8	Dottier accents . . . . .	494
8.4.9	<code>amsxtra</code> —Accents as superscripts . . . . .	495
8.4.10	Extra decorations . . . . .	495
8.5	Variable symbol commands . . . . .	495
8.5.1	Ellipsis . . . . .	496
8.5.2	Horizontal extensions . . . . .	497
8.5.3	Vertical extensions . . . . .	498
8.6	Words in mathematics . . . . .	499
8.6.1	The <code>\text</code> command . . . . .	499
8.6.2	Operator and function names . . . . .	499
8.7	Fine-tuning the mathematical layout . . . . .	502
8.7.1	Controlling the automatic sizing and spacing . . . . .	502
8.7.2	Sub-formulas . . . . .	503
8.7.3	Big-g delimiters . . . . .	504
8.7.4	Radical movements . . . . .	504
8.7.5	<code>Ghostbusters™</code> . . . . .	505
8.7.6	Horizontal spaces . . . . .	507
8.8	Fonts in formulas . . . . .	508
8.8.1	Additional math font commands . . . . .	509
8.8.2	<code>bm</code> —Making bold . . . . .	510
8.8.3	A collection of math font set-ups . . . . .	513

8.9	Symbols in formulas . . . . .	524
8.9.1	Mathematical symbol classes . . . . .	524
8.9.2	Letters, numerals, and other Ordinary symbols . . . . .	526
8.9.3	Mathematical accents . . . . .	529
8.9.4	Binary operator symbols . . . . .	529
8.9.5	Relation symbols . . . . .	531
8.9.6	Punctuation . . . . .	535
8.9.7	Operator symbols . . . . .	536
8.9.8	Opening and Closing symbols . . . . .	537
<b>9</b>	<b>L<sup>A</sup>T<sub>E</sub>X in a Multilingual Environment</b>	<b>539</b>
9.1	T <sub>E</sub> X and non-English languages . . . . .	539
9.1.1	Language-related aspects of typesetting . . . . .	541
9.1.2	Culture-related aspects of typesetting . . . . .	542
9.1.3	Babel—L <sup>A</sup> T <sub>E</sub> X speaks multiple languages . . . . .	542
9.2	The <code>babel</code> user interface . . . . .	543
9.2.1	Setting or getting the current language . . . . .	544
9.2.2	Handling shorthands . . . . .	547
9.2.3	Language attributes . . . . .	549
9.3	User commands provided by language options . . . . .	550
9.3.1	Translations . . . . .	550
9.3.2	Available shorthands . . . . .	550
9.3.3	Language-specific commands . . . . .	558
9.3.4	Layout considerations . . . . .	564
9.3.5	Languages and font encoding . . . . .	566
9.4	Support for non-Latin alphabets . . . . .	569
9.4.1	The Cyrillic alphabet . . . . .	569
9.4.2	The Greek alphabet . . . . .	574
9.4.3	The Hebrew alphabet . . . . .	576
9.5	Tailoring <code>babel</code> . . . . .	579
9.5.1	Hyphenating in several languages . . . . .	580
9.5.2	The package file . . . . .	581
9.5.3	The structure of the <code>babel</code> language definition file . . . . .	582
9.6	Other approaches . . . . .	591
9.6.1	More complex languages . . . . .	591
9.6.2	Omega . . . . .	592
<b>10</b>	<b>Graphics Generation and Manipulation</b>	<b>593</b>
10.1	Producing portable graphics and ornaments . . . . .	595
10.1.1	<code>boxedminipage</code> —Boxes with frames . . . . .	595
10.1.2	<code>shadow</code> —Boxes with shadows . . . . .	595
10.1.3	<code>fancybox</code> —Ornamental boxes . . . . .	596
10.1.4	<code>epic</code> —An enhanced picture environment . . . . .	600
10.1.5	<code>eepic</code> —Extending the <code>epic</code> package . . . . .	607
10.1.6	Special-purpose languages . . . . .	611

10.2	<code>LATEX</code> 's device-dependent graphics support . . . . .	613
10.2.1	Options for <code>graphics</code> and <code>graphicx</code> . . . . .	614
10.2.2	The <code>\includegraphics</code> syntax in the <code>graphics</code> package .	616
10.2.3	The <code>\includegraphics</code> syntax in the <code>graphicx</code> package .	618
10.2.4	Setting default key values for the <code>graphicx</code> package .	623
10.2.5	Declarations guiding the inclusion of images . . . . .	624
10.2.6	A caveat: Encapsulation is important . . . . .	627
10.3	Manipulating graphical objects in <code>LATEX</code> . . . . .	628
10.3.1	Scaling a <code>LATEX</code> box . . . . .	628
10.3.2	Resizing to a given size . . . . .	629
10.3.3	Rotating a <code>LATEX</code> box . . . . .	630
10.3.4	<code>rotating</code> —Revisited . . . . .	633
10.4	Display languages: PostScript, PDF, and SVG . . . . .	634
10.4.1	The PostScript language . . . . .	635
10.4.2	The <code>dvips</code> PostScript driver . . . . .	637
10.4.3	<code>pspicture</code> —An enhanced picture environment for <code>dvips</code> .	638
10.4.4	The Portable Document Format . . . . .	642
10.4.5	Scalable Vector Graphics . . . . .	644
11	<b>Index Generation</b> . . . . .	647
11.1	Syntax of the index entries . . . . .	648
11.1.1	Simple index entries . . . . .	650
11.1.2	Generating subentries . . . . .	650
11.1.3	Page ranges and cross-references . . . . .	651
11.1.4	Controlling the presentation form . . . . .	651
11.1.5	Printing special characters . . . . .	652
11.1.6	Creating a glossary . . . . .	653
11.1.7	Defining your own index commands . . . . .	653
11.1.8	Special considerations . . . . .	654
11.2	<code>makeindex</code> —A program to format and sort indexes .	654
11.2.1	Generating the formatted index . . . . .	655
11.2.2	Detailed options of the <code>MakeIndex</code> program . . . . .	655
11.2.3	Error messages . . . . .	658
11.2.4	Customizing the index with <code>MakeIndex</code> . . . . .	659
11.2.5	<code>MakeIndex</code> pitfalls . . . . .	665
11.3	<code>xindy</code> —An alternative to <code>MakeIndex</code> . . . . .	666
11.3.1	Generating the formatted index with <code>xindy</code> . . . . .	668
11.3.2	International indexing with <code>xindy</code> . . . . .	669
11.3.3	Modules for common tasks . . . . .	671
11.3.4	Style files for individual solutions . . . . .	673
11.4	Enhancing the index with <code>LATEX</code> features . . . . .	679
11.4.1	Modifying the layout . . . . .	679
11.4.2	<code>showidx</code> , <code>repeatindex</code> , <code>tocbibind</code> , <code>idxcite</code> —Little helpers .	680
11.4.3	<code>index</code> —Producing multiple indexes . . . . .	681

<b>12 Managing Citations</b>	<b>683</b>
12.1 Introduction . . . . .	683
12.1.1 Bibliographical reference schemes . . . . .	684
12.1.2 Markup structure for citations and bibliography . . . . .	686
12.1.3 Using $\text{\LaTeX}$ to produce the bibliography input . . . . .	687
12.2 The number-only system . . . . .	691
12.2.1 Standard $\text{\LaTeX}$ —Reference by number . . . . .	691
12.2.2 <code>cite</code> —Enhanced references by number . . . . .	693
12.2.3 <code>notoccite</code> —Solving a problem with unsorted citations . . . . .	697
12.3 The author-date system . . . . .	698
12.3.1 Early attempts . . . . .	699
12.3.2 <code>natbib</code> —Customizable author-date references . . . . .	700
12.3.3 <code>bibentry</code> —Full bibliographic entries in running text . . . . .	710
12.4 The author-number system . . . . .	712
12.4.1 <code>natbib</code> —Revisited . . . . .	712
12.5 The short-title system . . . . .	715
12.5.1 <code>jurabib</code> —Customizable short-title references . . . . .	715
12.5.2 <code>camel</code> —Dedicated law support . . . . .	743
12.6 Multiple bibliographies in one document . . . . .	745
12.6.1 <code>chapterbib</code> —Bibliographies per included file . . . . .	747
12.6.2 <code>bibunits</code> —Bibliographies for arbitrary units . . . . .	749
12.6.3 <code>bibtopic</code> —Combining references by topic . . . . .	753
12.6.4 <code>multibib</code> —Separate global bibliographies . . . . .	755
<b>13 Bibliography Generation</b>	<b>757</b>
13.1 The $\text{\LaTeX}$ program and some variants . . . . .	758
13.1.1 <code>bibtex8</code> —An 8-bit reimplemention of $\text{\LaTeX}$ . . . . .	759
13.1.2 Recent developments . . . . .	759
13.2 The $\text{\LaTeX}$ database format . . . . .	761
13.2.1 Entry types and fields . . . . .	762
13.2.2 The text part of a field explained . . . . .	764
13.2.3 Abbreviations in $\text{\LaTeX}$ . . . . .	769
13.2.4 The $\text{\LaTeX}$ preamble . . . . .	771
13.2.5 Cross-referencing entries . . . . .	772
13.3 On-line bibliographies . . . . .	773
13.4 Bibliography database management tools . . . . .	774
13.4.1 <code>biblist</code> —Printing $\text{\LaTeX}$ database files . . . . .	774
13.4.2 <code>bibtools</code> —A collection of command-line tools . . . . .	775
13.4.3 <code>bibclean</code> , etc.—A second set of command-line tools . . . . .	777
13.4.4 <code>bibtool</code> —A multipurpose command-line tool . . . . .	778
13.4.5 <code>pybliographer</code> —An extensible bibliography manager . . . . .	784
13.4.6 <code>JBibtexManager</code> —A $\text{\LaTeX}$ database manager in Java . . . . .	787
13.4.7 <code>BibTexMng</code> —A $\text{\LaTeX}$ database manager for Windows . . . . .	789

13.5	Formatting the bibliography with $\text{\LaTeX}$ styles . . . . .	790
13.5.1	A collection of $\text{\LaTeX}$ style files . . . . .	791
13.5.2	<i>custom-bib</i> —Generate $\text{\LaTeX}$ styles with ease . . . . .	798
13.6	The $\text{\LaTeX}$ style language . . . . .	805
13.6.1	The $\text{\LaTeX}$ style file commands and built-in functions . . . . .	805
13.6.2	The documentation style <i>btxbst.doc</i> . . . . .	806
13.6.3	Introducing small changes in a style file . . . . .	809
<b>14</b>	<b><math>\text{\LaTeX}</math> Package Documentation Tools</b>	<b>813</b>
14.1	<i>doc</i> —Documenting $\text{\LaTeX}$ and other code . . . . .	813
14.1.1	General conventions for the source file . . . . .	814
14.1.2	Describing new macros and environments . . . . .	815
14.1.3	Cross-referencing all macros used . . . . .	817
14.1.4	The documentation driver . . . . .	818
14.1.5	Conditional code in the source . . . . .	819
14.2	<i>docstrip.tex</i> —Producing ready-to-run code . . . . .	824
14.2.1	Invocation of the <i>DOCSTRIP</i> utility . . . . .	825
14.2.2	<i>DOCSTRIP</i> script commands . . . . .	826
14.2.3	Installation support and configuration . . . . .	830
14.2.4	Using <i>DOCSTRIP</i> with other languages . . . . .	833
14.3	<i>ltxdoc</i> —A simple $\text{\LaTeX}$ documentation class . . . . .	834
14.3.1	Extensions provided by <i>ltxdoc</i> . . . . .	834
14.3.2	Customizing the output of documents that use <i>ltxdoc</i> . . . . .	835
14.4	Making use of version control tools . . . . .	836
14.4.1	<i>rcs</i> —Accessing individual keywords . . . . .	837
14.4.2	<i>rcsinfo</i> —Parsing the <i>\$Id\$</i> keyword . . . . .	838
<b>A</b>	<b>A <math>\text{\LaTeX}</math> Overview for Preamble, Package, and Class Writers</b>	<b>841</b>
A.1	Linking markup and formatting . . . . .	841
A.1.1	Command and environment names . . . . .	842
A.1.2	Defining new commands . . . . .	843
A.1.3	Defining new environments . . . . .	847
A.1.4	Defining and changing counters . . . . .	851
A.1.5	Defining and changing space parameters . . . . .	854
A.2	Page markup—Boxes and rules . . . . .	860
A.2.1	LR boxes . . . . .	860
A.2.2	Paragraph boxes . . . . .	862
A.2.3	Rule boxes . . . . .	866
A.2.4	Manipulating boxed material . . . . .	868
A.2.5	Box commands and color . . . . .	870
A.3	Control structure extensions . . . . .	871
A.3.1	<i>calc</i> —Arithmetic calculations . . . . .	871
A.3.2	<i>ifthen</i> —Advanced control structures . . . . .	872

A.4	Package and class file structure . . . . .	877
A.4.1	The identification part . . . . .	877
A.4.2	The initial code part . . . . .	880
A.4.3	The declaration of options . . . . .	880
A.4.4	The execution of options . . . . .	881
A.4.5	The package loading part . . . . .	882
A.4.6	The main code part . . . . .	883
A.4.7	Special commands for package and class files . . . . .	883
A.4.8	Special commands for class files . . . . .	886
A.4.9	A minimal class file . . . . .	888
<b>B</b>	<b>Tracing and Resolving Problems</b>	<b>889</b>
B.1	Error messages . . . . .	890
B.1.1	Dying with memory exceeded . . . . .	915
B.2	Warnings and informational messages . . . . .	920
B.3	T <sub>E</sub> X and IAT <sub>E</sub> X commands for tracing . . . . .	931
B.3.1	Displaying command definitions and register values . . . . .	932
B.3.2	Diagnosing page-breaking problems . . . . .	935
B.3.3	Diagnosing and solving paragraph-breaking problems . . . . .	939
B.3.4	Other low-level tracing tools . . . . .	943
B.3.5	trace—Selectively tracing command execution . . . . .	945
<b>C</b>	<b>IAT<sub>E</sub>X Software and User Group Information</b>	<b>947</b>
C.1	Getting help . . . . .	947
C.2	How to get those T <sub>E</sub> X files? . . . . .	948
C.3	Using CTAN . . . . .	950
C.3.1	Finding files on the archive . . . . .	950
C.3.2	Using the T <sub>E</sub> X file catalogue . . . . .	950
C.3.3	Getting multiple files . . . . .	952
C.4	Finding the documentation on your T <sub>E</sub> X system . . . . .	954
C.4.1	texdoc—Command-line interface for a search by name . . . . .	954
C.4.2	texdoctk—Panel interface for a search by subject . . . . .	955
C.5	T <sub>E</sub> X user groups . . . . .	956
<b>D</b>	<b>TLC2 T<sub>E</sub>X CD</b>	<b>959</b>
	<b>Bibliography</b>	<b>963</b>
	<b>Index of Commands and Concepts</b>	<b>983</b>
	<b>People</b>	<b>1080</b>
	<b>Biographies</b>	<b>1083</b>
	<b>Production Notes</b>	<b>1089</b>