

Contents

1	Turning On: Hints	1
1.1	The Semicolon	2
1.2	Using Help	17
1.3	Helpful Hints	19
1.4	Frequent Errors	20
1.5	Reference Material: types and commands	30
1.6	Your own Environment: .ini and interface	52
2	Structures and Analysis: Help	61
2.1	Pulling Maple Apart	62
2.1.1	Functions and Assignment	63
2.1.2	Lists, Sets and Sequences	66
2.1.3	Convert	68
2.1.4	Set Operations and Types	70
2.1.5	Catenation	72
2.2	Area of a Lake	76
2.3	Environmental Numbers	78
2.3.1	Units Conversion	78
2.3.2	Calibration of Permeation Tubes	80
2.3.3	Greenhouse Atmospheres	83
2.4	Worksheets and Documents	89
2.4.1	Worksheets	89
2.4.2	Execution Groups	90
2.4.3	Sections and Subsections	90
2.4.4	Headings and Listing	90
2.4.5	Cross Referencing, HyperLinks	91
2.4.6	Exporting: ASCII, LaTeX and HTML	91
2.4.7	Transferring: Powerpoint, Word, Scientific Workplace and Excel	94
2.4.8	Getting into the System	94
2.4.9	Command Line Maple	96
2.5	AAArgh->Self Help	97
2.5.1	Help through a simple readme file	97

2.5.2	Help by including attributes	99
2.5.3	Edit/Find	100
2.5.4	Active Worksheets	102
2.5.5	More Detail from Maple	102
3	Manipulations, Procedures and Plots	113
3.1	Functions and Procedures	114
3.2	Plotting	118
3.3	Procedures	122
3.4	Operands	127
3.5	Dots, Arrows and Fill	134
3.6	plot Options	143
3.7	PLOT Structures	150
3.7.1	Direct Editing	152
3.7.2	Using subsop	153
3.7.3	More Structures, Colour	156
3.8	Fractals	162
3.9	Pretty Rotations	173
4	Applications: Field Data	179
4.1	Contour Data	180
4.1.1	Reading in Data	182
4.1.2	The Monitoring Boreholes	185
4.1.3	Saving Data	188
4.2	Bubbles: A Visualization	190
4.2.1	Reading the Data File	190
4.2.2	A lookup of Data	192
4.2.3	Bubble Sequences	194
4.2.4	Identification with Colour	194
4.2.5	A Simplest Plot	195
4.2.6	Bubble Spheres	196
4.2.7	Using Plot Structures	196
4.2.8	Animation of the Bubbles	198
4.2.9	Animated Swarms of Bubbles	200
4.2.10	Streaks of Bubbles	202
4.3	Interpolation: An Application	204
4.3.1	A Rough Look at the Data	204
4.3.2	Formulation	205
4.3.3	Choosing Appropriate Sinks	210
4.3.4	Selecting Data	213
4.3.5	Interpolation Equation	218
4.3.6	Expanded Equations	221
4.3.7	A Single Equation in x and y	224
4.4	Acid Rain: A Look at Solution Chemistry	228

4.4.1	Carbon Dioxide	228
4.4.2	Carbon Dioxide, Sulfur Dioxide and Ammonia	231
4.4.3	Kinetics of Sulfate Formation	234
4.4.4	Sulfate Change with Time	237
4.4.5	Fitting the Data	241
4.4.6	The Sulfate Concentrations	242
4.4.7	The pH	242
5	Simultaneous Solutions: Matrices	245
5.1	Equations and Matrices	246
5.1.1	What are the Unknowns?	246
5.1.2	Properties of Polynomials	249
5.1.3	Matrix Operations	253
5.2	Breakfast Foods	255
5.3	Balancing a Chemical Equation	258
5.4	Dilution: Rivers and Solutions	261
5.5	An Air Quality Index: Least Squares	266
5.6	Turbulence: Rotating Statistics	271
5.6.1	Transformation Matrices	271
5.6.2	Analysis of Turbulence Data	276
5.6.3	The Required Rotations	281
5.6.4	Rotating the Statistics	284
5.6.5	Wind Units	286
5.7	Struvite: Fertilizer and Kidney Stone	288
5.7.1	The Chemical Equilibria	289
5.7.2	The Electroneutrality Equation	290
5.7.3	Solid Phase Mass Balance	291
5.7.4	The Solution	292
5.7.5	Assign the Right Variables	295
5.7.6	Save your Results	296
5.7.7	Plotting the Effects of H and Mg	297
5.7.8	Design Calculation	300
5.7.9	A Double Newton-Raphson Technique	304
6	Active Plotting and Spreadsheets	311
6.1	Clicking on a Solution	312
6.2	Capture and Post	316
6.3	Smartplots	325
6.4	Spreadsheets	331
6.5	I/O from Spreadsheets	342

AAArgh->	357
Restricted Access	358
Help through Maple's help system	361
Help with a Package	362
A Package as a Table	376
A Listing of Exercises	383
Improvised Routines	385
Index	387