

Contents

List of Figures	ix
List of Tables	xi
Preface	xiii
1 Introduction	1
1.1 The fifty-cent tour	2
1.2 Graphical versus command-line usage	3
1.3 Help	3
1.4 Basic commands and syntax	4
1.5 Saving and loading work	6
1.6 Things about MATLAB that are very nice to know, but which often do not come to the attention of beginners	7
Exercises	8
2 Arrays and Matrices	11
2.1 Building arrays and matrices	12
2.2 Referencing elements	14
2.3 Matrix operations	18
2.4 Array operations	20
2.5 Sparse matrices	23
Exercises	25
3 Scripts and Functions	27
3.1 Using scripts effectively	28
3.2 Functions and workspaces	29
3.3 Conditionals: <code>if</code> and <code>switch</code>	31
3.4 Loops: <code>for</code> and <code>while</code>	32
3.5 Debugging and profiling	33
Exercises	34
4 More on Functions	37
4.1 Function handles and anonymous functions	37
4.2 Subfunctions and nested functions	39

4.3	Errors and warnings	41
4.4	Input and output arguments, revisited	41
	Exercises	42
5	Graphics	45
5.1	Data plots versus function plots	45
	5.1.1 ez plots	46
	5.1.2 Two-dimensional data plots	48
	5.1.3 Three-dimensional data plots	49
5.2	Annotation	50
5.3	Handles and properties	51
5.4	Color	52
5.5	Saving and exporting figures	53
5.6	Other common graphics techniques	55
	Exercises	56
6	Advanced Techniques	59
6.1	Memory preallocation	59
6.2	Vectorization	60
6.3	Masking	63
6.4	Scoping exceptions	64
6.5	Strings	65
6.6	Cell arrays	67
6.7	Structures	70
	Exercises	72
7	Scientific Computing	75
7.1	Linear algebra	75
7.2	Iterative linear algebra	78
7.3	Rootfinding	79
7.4	Optimization	80
7.5	Data fitting and interpolation	81
7.6	Integration	84
7.7	Initial-value problems	85
7.8	Boundary-value problems	86
7.9	Time-dependent partial differential equations	88
	Exercises	90
	Afterword	93
	Index	95