
Contents

1	An Introduction to R	1
1.1	What Is R?	1
1.2	Installing R	2
1.3	Help and Documentation	4
1.4	Data Objects in R	5
1.5	Data Import and Export	9
1.6	Basic Data Manipulation	11
1.7	Simple Summary Statistics	14
1.8	Organising an Analysis	18
1.9	Summary	20
2	Simple Inference	21
2.1	Introduction	21
2.2	Statistical Tests	25
2.3	Analysis Using R	29
2.4	Summary	39
3	Conditional Inference	41
3.1	Introduction	41
3.2	Conditional Test Procedures	44
3.3	Analysis Using R	46
3.4	Summary	53
4	Analysis of Variance	55
4.1	Introduction	55
4.2	Analysis of Variance	58
4.3	Analysis Using R	59
4.4	Summary	71
5	Multiple Linear Regression	73
5.1	Introduction	73
5.2	Multiple Linear Regression	74
5.3	Analysis Using R	76
5.4	Summary	85

6 Logistic Regression and Generalised Linear Models	89
6.1 Introduction	89
6.2 Logistic Regression and Generalised Linear Models	92
6.3 Analysis Using R	94
6.4 Summary	106
7 Density Estimation	109
7.1 Introduction	109
7.2 Density Estimation	111
7.3 Analysis Using R	117
7.4 Summary	125
8 Recursive Partitioning	131
8.1 Introduction	131
8.2 Recursive Partitioning	131
8.3 Analysis Using R	133
8.4 Summary	141
9 Survival Analysis	143
9.1 Introduction	143
9.2 Survival Analysis	144
9.3 Analysis Using R	150
9.4 Summary	157
10 Analysing Longitudinal Data I	159
10.1 Introduction	159
10.2 Analysing Longitudinal Data	162
10.3 Linear Mixed Effects Models	163
10.4 Analysis Using R	165
10.5 Prediction of Random Effects	168
10.6 The Problem of Dropouts	169
10.7 Summary	172
11 Analysing Longitudinal Data II	175
11.1 Introduction	175
11.2 Generalised Estimating Equations	177
11.3 Analysis Using R	179
11.4 Summary	194
12 Meta-Analysis	197
12.1 Introduction	197
12.2 Systematic Reviews and Meta-Analysis	199
12.3 Statistics of Meta-Analysis	201
12.4 Analysis Using R	202
12.5 Meta-Regression	203

12.6 Publication Bias	207
12.7 Summary	211
13 Principal Component Analysis	215
13.1 Introduction	215
13.2 Principal Component Analysis	215
13.3 Analysis Using R	218
13.4 Summary	223
14 Multidimensional Scaling	227
14.1 Introduction	227
14.2 Multidimensional Scaling	227
14.3 Analysis Using R	233
14.4 Summary	239
15 Cluster Analysis	243
15.1 Introduction	243
15.2 Cluster Analysis	245
15.3 Analysis Using R	248
15.4 Summary	253
Bibliography	259
Index	271