
Contents

Preface to Third Edition	xi
Preface to Second Edition	xiii
Preface to First Edition	xv
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 Computing with Data	14
1.8 Organizing an Analysis	20
1.9 Summary of Findings	21
1.10 Final Comments	23
2 Data Analysis Using Graphical Displays	25
2.1 Introduction	25
2.2 Initial Data Analysis	27
2.3 Analysis Using R	29
2.4 Summary of Findings	40
2.5 Final Comments	41
3 Simple Inference	47
3.1 Introduction	47
3.2 Statistical Tests	51
3.3 Analysis Using R	55
3.4 Summary of Findings	65
3.5 Final Comments	66
4 Conditional Inference	69
4.1 Introduction	69
4.2 Conditional Test Procedures	72
4.3 Analysis Using R	74

4.4	Summary of Findings	81
4.5	Final Comments	81
5	Analysis of Variance	83
5.1	Introduction	83
5.2	Analysis of Variance	86
5.3	Analysis Using R	87
5.4	Summary of Findings	98
5.5	Final Comments	99
6	Simple and Multiple Linear Regression	101
6.1	Introduction	101
6.2	Simple Linear Regression	103
6.3	Multiple Linear Regression	104
6.4	Analysis Using R	107
6.5	Summary of Findings	118
6.6	Final Comments	119
7	Logistic Regression and Generalized Linear Models	121
7.1	Introduction	121
7.2	Logistic Regression and Generalized Linear Models	124
7.3	Analysis Using R	127
7.4	Summary of Findings	145
7.5	Final Comments	147
8	Density Estimation	149
8.1	Introduction	149
8.2	Density Estimation	151
8.3	Analysis Using R	156
8.4	Summary of Findings	164
8.5	Final Comments	165
9	Recursive Partitioning	171
9.1	Introduction	171
9.2	Recursive Partitioning	174
9.3	Analysis Using R	175
9.4	Summary of Findings	186
9.5	Final Comments	186
10	Scatterplot Smoothers and Additive Models	187
10.1	Introduction	187
10.2	Scatterplot Smoothers and Generalized Additive Models	191
10.3	Analysis Using R	196
10.4	Summary of Findings	205
10.5	Final Comments	206

11 Survival Analysis	209
11.1 Introduction	209
11.2 Survival Analysis	210
11.3 Analysis Using R	216
11.4 Summary of Findings	223
11.5 Final Comments	224
12 Quantile Regression	227
12.1 Introduction	227
12.2 Quantile Regression	228
12.3 Analysis Using R	230
12.4 Summary of Findings	241
12.5 Final Comments	242
13 Analyzing Longitudinal Data I	243
13.1 Introduction	243
13.2 Analyzing Longitudinal Data	246
13.3 Linear Mixed Effects Models	247
13.4 Analysis Using R	249
13.5 Prediction of Random Effects	253
13.6 The Problem of Dropouts	253
13.7 Summary of Findings	256
13.8 Final Comments	258
14 Analyzing Longitudinal Data II	261
14.1 Introduction	261
14.2 Methods for Non-normal Distributions	263
14.3 Analysis Using R: GEE	268
14.4 Analysis Using R: Random Effects	277
14.5 Summary of Findings	280
14.6 Final Comments	280
15 Simultaneous Inference and Multiple Comparisons	283
15.1 Introduction	283
15.2 Simultaneous Inference and Multiple Comparisons	286
15.3 Analysis Using R	287
15.4 Summary of Findings	294
15.5 Final Comments	295
16 Missing Values	297
16.1 Introduction	297
16.2 The Problems of Missing Data	298
16.3 Dealing With Missing Values	299
16.4 Imputing Missing Values	300
16.5 Analyzing Multiply Imputed Data	301

16.6 Analysis Using R	303
16.7 Summary of Findings	311
16.8 Final Comments	311
17 Meta-Analysis	313
17.1 Introduction	313
17.2 Systematic Reviews and Meta-Analysis	315
17.3 Statistics of Meta-Analysis	317
17.4 Analysis Using R	319
17.5 Meta-Regression	322
17.6 Publication Bias	323
17.7 Summary of Findings	325
17.8 Final Comments	325
18 Bayesian Inference	331
18.1 Introduction	331
18.2 Bayesian Inference	333
18.3 Analysis Using R	337
18.4 Summary of Findings	344
18.5 Final Comments	344
19 Principal Component Analysis	347
19.1 Introduction	347
19.2 Principal Component Analysis	347
19.3 Analysis Using R	350
19.4 Summary of Findings	357
19.5 Final Comments	357
20 Multidimensional Scaling	361
20.1 Introduction	361
20.2 Multidimensional Scaling	361
20.3 Analysis Using R	367
20.4 Summary of Findings	372
20.5 Final Comments	373
21 Cluster Analysis	377
21.1 Introduction	377
21.2 Cluster Analysis	380
21.3 Analysis Using R	387
21.4 Summary of Findings	394
21.5 Final Comments	397
Bibliography	399
Index	415