



Contents

Acknowledgments ix

Introducing SAS Software x

About This Book xi

What's New xiv

Chapter 1 Getting Started Using SAS Software 1

- 1.1 The SAS Language 2
- 1.2 SAS Data Sets 4
- 1.3 The Two Parts of a SAS Program 6
- 1.4 The DATA Step's Built-in Loop 8
- 1.5 Choosing a Mode for Submitting SAS Programs 10
- 1.6 Windows and Commands in the SAS Windowing Environment 12
- 1.7 Submitting a Program in the SAS Windowing Environment 14
- 1.8 Reading the SAS Log 16
- 1.9 Viewing Your Results in the Output Window 18
- 1.10 Creating HTML Output 20
- 1.11 SAS Data Libraries 22
- 1.12 Viewing Data Sets in the Viewtable Window 24
- 1.13 Viewing the Properties of Data Sets with SAS Explorer 26
- 1.14 Using SAS System Options 28

Chapter 2 Getting Your Data into SAS 31

- 2.1 Methods for Getting Your Data into SAS 32
- 2.2 Entering Data with the Viewtable Window 34
- 2.3 Reading Files with the Import Wizard 36
- 2.4 Telling SAS Where to Find Your Raw Data 38
- 2.5 Reading Raw Data Separated by Spaces 40
- 2.6 Reading Raw Data Arranged in Columns 42
- 2.7 Reading Raw Data Not in Standard Format 44
- 2.8 Selected Informats 46
- 2.9 Mixing Input Styles 48
- 2.10 Reading Messy Raw Data 50

2.11	Reading Multiple Lines of Raw Data per Observation	52
2.12	Reading Multiple Observations per Line of Raw Data	54
2.13	Reading Part of a Raw Data File	56
2.14	Controlling Input with Options in the INFILE Statement	58
2.15	Reading Delimited Files with the DATA Step	60
2.16	Reading Delimited Files with the IMPORT Procedure	62
2.17	Reading PC Files with the IMPORT Procedure	64
2.18	Reading PC Files with DDE	66
2.19	Temporary versus Permanent SAS Data Sets	68
2.20	Using Permanent SAS Data Sets with LIBNAME Statements	70
2.21	Using Permanent SAS Data Sets by Direct Referencing	72
2.22	Listing the Contents of a SAS Data Set	74
Chapter 3	Working with Your Data	77
3.1	Creating and Redefining Variables	78
3.2	Using SAS Functions	80
3.3	Selected SAS Character Functions	82
3.4	Selected SAS Numeric Functions	84
3.5	Using IF-THEN Statements	86
3.6	Grouping Observations with IF-THEN/ELSE Statements	88
3.7	Subsetting Your Data	90
3.8	Working with SAS Dates	92
3.9	Selected Date Informats, Functions, and Formats	94
3.10	Using the RETAIN and Sum Statements	96
3.11	Simplifying Programs with Arrays	98
3.12	Using Shortcuts for Lists of Variable Names	100
Chapter 4	Sorting, Printing, and Summarizing Your Data	103
4.1	Using SAS Procedures	104
4.2	Subsetting in Procedures with the WHERE Statement	106
4.3	Sorting Your Data with PROC SORT	108
4.4	Printing Your Data with PROC PRINT	110
4.5	Changing the Appearance of Printed Values with Formats	112
4.6	Selected Standard Formats	114
4.7	Creating Your Own Formats Using PROC FORMAT	116
4.8	Writing Simple Custom Reports	118
4.9	Summarizing Your Data Using PROC MEANS	120

4.10	Writing Summary Statistics to a SAS Data Set	122
4.11	Counting Your Data with PROC FREQ	124
4.12	Producing Tabular Reports with PROC TABULATE	126
4.13	Adding Statistics to PROC TABULATE Output	128
4.14	Enhancing the Appearance of PROC TABULATE Output	130
4.15	Changing Headers in PROC TABULATE Output	132
4.16	Specifying Multiple Formats for Data Cells in PROC TABULATE Output	134
4.17	Producing Simple Output with PROC REPORT	136
4.18	Using DEFINE Statements in PROC REPORT	138
4.19	Creating Summary Reports with PROC REPORT	140
4.20	Adding Summary Breaks to PROC REPORT Output	142
4.21	Adding Statistics to PROC REPORT Output	144
4.22	Adding Computed Variables to PROC REPORT Output	146
4.23	Grouping Data in Procedures with User-Defined Formats	148
Chapter 5	Enhancing Your Output with ODS	151
5.1	Concepts of the Output Delivery System	152
5.2	Tracing and Selecting Procedure Output	154
5.3	Creating SAS Data Sets from Procedure Output	156
5.4	Using ODS Statements to Create HTML Output	158
5.5	Using ODS Statements to Create RTF Output	160
5.6	Using ODS Statements to Create PRINTER Output	162
5.7	Customizing Titles and Footnotes	164
5.8	Customizing PROC PRINT Output with the STYLE= Option	166
5.9	Customizing PROC REPORT Output with the STYLE= Option	168
5.10	Customizing PROC TABULATE Output with the STYLE= Option	170
5.11	Adding Traffic-Lighting to Your Output	172
5.12	Selected Style Attributes	174
Chapter 6	Modifying and Combining SAS Data Sets	177
6.1	Modifying a Data Set Using the SET Statement	178
6.2	Stacking Data Sets Using the SET Statement	180
6.3	Interleaving Data Sets Using the SET Statement	182
6.4	Combining Data Sets Using a One-to-One Match Merge	184
6.5	Combining Data Sets Using a One-to-Many Match Merge	186
6.6	Merging Summary Statistics with the Original Data	188
6.7	Combining a Grand Total with the Original Data	190
6.8	Updating a Master Data Set with Transactions	192

6.9	Writing Multiple Data Sets Using the OUTPUT Statement	194
6.10	Making Several Observations from One Using the OUTPUT Statement	196
6.11	Using SAS Data Set Options	198
6.12	Tracking and Selecting Observations with the IN= Option	200
6.13	Selecting Observations with the WHERE= Option	202
6.14	Changing Observations to Variables Using PROC TRANSPOSE	204
6.15	Using SAS Automatic Variables	206
Chapter 7	Writing Flexible Code with the SAS Macro Facility	209
7.1	Macro Concepts	210
7.2	Substituting Text with Macro Variables	212
7.3	Creating Modular Code with Macros	214
7.4	Adding Parameters to Macros	216
7.5	Writing Macros with Conditional Logic	218
7.6	Writing Data-Driven Programs with CALL SYMPUT	220
7.7	Debugging Macro Errors	222
Chapter 8	Using Basic Graphical and Statistical Procedures	225
8.1	Concepts of ODS Graphics	226
8.2	Creating Bar Charts with PROC SGPLOT	228
8.3	Creating Histograms and Box Plots with PROC SGPLOT	230
8.4	Creating Scatter Plots with PROC SGPLOT	232
8.5	Creating Series Plots with PROC SGPLOT	234
8.6	Creating Fitted Curves with PROC SGPLOT	236
8.7	Examining the Distribution of Data with PROC UNIVARIATE	238
8.8	Creating Statistical Graphics with PROC UNIVARIATE	240
8.9	Producing Statistics with PROC MEANS	242
8.10	Testing Categorical Data with PROC FREQ	244
8.11	Creating Statistical Graphics with PROC FREQ	246
8.12	Examining Correlations with PROC CORR	248
8.13	Creating Statistical Graphics with PROC CORR	250
8.14	Using PROC REG for Simple Regression Analysis	252
8.15	Creating Statistical Graphics with PROC REG	254
8.16	Using PROC ANOVA for One-Way Analysis of Variance	256
8.17	Reading the Output of PROC ANOVA	258

Chapter 9	Exporting Your Data	261
9.1	Methods for Exporting Your Data	262
9.2	Writing Files Using the Export Wizard	264
9.3	Writing Delimited Files with the EXPORT Procedure	266
9.4	Writing PC Files with the EXPORT Procedure	268
9.5	Writing Raw Data Files with the DATA Step	270
9.6	Writing Delimited and HTML Files Using ODS	272
9.7	Sharing SAS Data Sets with Other Types of Computers	274
Chapter 10	Debugging Your SAS Programs	277
10.1	Writing SAS Programs That Work	278
10.2	Fixing Programs That Don't Work	280
10.3	Searching for the Missing Semicolon	282
10.4	Note: INPUT Statement Reached Past the End of the Line	284
10.5	Note: Lost Card	286
10.6	Note: Invalid Data	288
10.7	Note: Missing Values Were Generated	290
10.8	Note: Numeric Values Have Been Converted to Character (or Vice Versa)	292
10.9	DATA Step Produces Wrong Results but No Error Message	294
10.10	The DATA Step Debugger	296
10.11	Error: Invalid Option, Error: The Option Is Not Recognized, or Error: Statement Is Not Valid	298
10.12	Note: Variable Is Uninitialized or Error: Variable Not Found	300
10.13	SAS Truncates a Character Variable	302
10.14	SAS Stops in the Middle of a Job	304
10.15	SAS Runs Out of Memory or Disk Space	306
Appendix A	Where to Go from Here	310
Appendix B	Coming to SAS from SPSS	312
Appendix C	Coming to SAS from a Programming Language	322
Appendix D	Coming to SAS from SQL	326
Index		335

