

Contents

<i>Foreword</i>	<i>xxiii</i>
<i>About the Author</i>	<i>xxv</i>
<i>About the Foreword Author</i>	<i>xxvi</i>
<i>About the Technical Reviewers</i>	<i>xxvii</i>
<i>Preface</i>	<i>xxix</i>
<i>Acknowledgments</i>	<i>xxxi</i>
<i>Introduction</i>	<i>xxxiii</i>
Chapter 1 SAS Basics	1
<i>Getting Started</i>	<i>1</i>
1 Understanding what the SAS System is	1
2 Equating SAS terminology with other software and database languages	2
3 Visualizing the SAS data set structure	3
4 Naming conventions for data sets and variables	3
5 Understanding the importance of keywords and the semicolon	3
6 Coding SAS statements in a “free format” style	3
7 Understanding the role of the SAS Supervisor	4
8 Creating variables	4
9 Avoiding reserved names when naming data sets and variables	5
10 Creating observations	5
11 Understanding the difference between in-stream versus external input data	5
12 Understanding the storage format used by SAS System files	6
13 Creating observations with a DATA statement	6
14 Creating observations with an OUTPUT statement	6
15 Creating observations with a RETURN statement	6
16 Creating observations with the SQL procedure	6
17 Understanding the difference between interactive and batch mode	7
18 Turning off the SAS Display Manager System	7
19 Understanding the control flow of a standard SAS program	7
20 Understanding the control flow of a Macro program	8
21 Understanding the concept of step boundaries	8
22 Accessing the built-in Help facility	9
23 Exiting the SAS System	9
SAS System Options	9
1 Controlling how a SAS session performs and behaves	10
2 Determining the settings of SAS System options at SAS invocation	10

3	Displaying SAS System option settings	10
4	Changing SAS System option settings	10
5	Specifying frequently used SAS options in the Configuration file	10
6	Controlling SAS System initialization	10
7	Specifying the AUTOEXEC= system option	11
8	Running a SAS program in batch or non-interactive mode	11
9	Executing SAS statements after AUTOEXEC file	11
10	Erasing WORK library files at SAS invocation	11
11	Erasing WORK library files at the end of a SAS session	11
12	Specifying a value for the YEARCUTOFF= system option	11
13	Centering procedure output	12
14	Displaying the date and time at the top of each printed page	12
15	Specifying procedures to use labels	12
16	Specifying the printer line width and number of lines	12
17	Specifying a value to use for printing numeric missing values	12
18	Specifying a value to use for invalid numeric data	13
19	Displaying a page number at the top of each printed page	13
20	Resetting the page number	13
21	Writing SAS source statements to the SAS Log	13
22	Specifying the SOURCE option for problem detection and resolution	13
23	Writing SAS source files included with a %INCLUDE statement to the SAS Log	13
24	Specifying the SOURCE2 option for problem detection and resolution	14
25	Writing a subset of the performance statistics to the SAS Log	14
26	Writing all performance statistics to the SAS Log	14
27	Controlling what observation to begin reading in a data set	14
28	Resetting the FIRSTOBS= system option back to the first observation	14
29	Specifying the most recently created data set to use in a read operation	14
30	Specifying the last observation to process	15
31	Processing a maximum number of observations with OBS=MAX	15
32	Checking syntax in a DATA or PROC step	15
33	Specifying OBS=MAX with WHERE	15
34	Processing one or more observations in the middle of a data set	15
35	Preventing SAS data sets from accidentally being replaced	15
36	Reducing the size of a SAS data set through compression	15
37	Uncompressing a data set's observations	16
38	Tracking and reusing free space in a compressed data set	16
39	Controlling error-message printing associated with data errors	16
40	Terminating a SAS program with an abnormal termination (abend)	16
41	Disabling the SAS Macro language	17
42	Printing multiple output pages on the same page	17
43	Printing output in color	17
44	Specifying the number of copies of output to print	17
45	Opening an application with the X command in a minimized window	18

46	Generating an error message when a format isn't found	18
47	Specifying the sort utility to use in sorting data	18
48	Specifying a sort utility with the SORTPGM= option	18
49	Exploring other SAS System Options	18
<i>SAS Display Manager System</i>		<i>18</i>
1	Using the SAS Program Editor window	19
2	Viewing the Log window	19
3	Viewing the Output Window	20
4	Accessing output in the Results window	20
5	Viewing the Output Manager window	20
6	Using Output Manager commands	21
7	Clicking your way from one window to the next	22
8	Autosaving your work	22
9	Saving your work	22
10	Turning the Enhanced Editor on	22
11	Finding what you want	22
12	Having windows at your command anytime and anywhere	23
13	Getting help in the SAS System	23
14	Viewing and changing SAS System options	23
15	Browsing, modifying, and saving function key settings	23
16	Exploring toolbar buttons	24
17	Customizing toolbar button settings	24
18	Controlling how many commands are saved	25
19	Changing Editor options	25
20	Checking program text for spelling errors	26
21	Clearing the contents of the Recall buffer	26
22	Clearing the contents of the Program Editor window	26
23	Clearing the contents of the Log window	27
24	Clearing the contents of the Output window	27
25	Clearing tab settings	27
26	Clearing the contents of the active window	27
27	Replacing the command line with the PMENU Facility	27
28	Disabling the PMENU Facility	27
29	Using Function Key shortcuts	27
30	Accessing Display Manager Windows	28
31	Using Display Manager commands	28
32	Using Editor commands	28
33	Using Editor line commands	28
<i>SAS Explorer</i>		<i>34</i>
1	Invoking SAS Explorer	34
2	Creating a new library reference	34
3	Selecting one or more files	34
4	Viewing a file's properties	34

5	Copying files from one library to another	35
6	Moving files from one library to another	35
7	Duplicating files	35
8	Renaming files	35
9	Deleting files from a library	35
10	Sorting files	36
11	Refreshing the file order	36
12	Resizing detail columns	37
13	Toggling between Show Tree on and Show Tree off	37
14	Viewing the contents of a catalog with Explorer	37
15	Displaying large icons for each file	38
16	Displaying small icons for each file	39
17	Displaying files in a list	39
18	Displaying files and all their details	40
19	Exploring Explorer keyboard shortcuts	40
20	Exploring Explorer commands	40
	<i>Summary</i>	41

Chapter 2 Data Access43

	<i>External Data</i>	43
1	Exploring file types	43
2	Identifying external text data	44
3	Understanding the input buffer	44
4	Coding an INFILE statement with in-stream data	44
5	Reading blank-delimited data with list input	44
6	Reading comma-delimited input files	45
7	Reading comma-delimited input containing missing values	45
8	Reading comma-delimited input containing quoted values	46
9	Reading tab-delimited input	46
10	Reading named-input data	47
11	Mixing other styles of input with named-input data	48
12	Reading comma-delimited data with modified-list-input	48
13	Avoiding truncation when reading varying length records	49
14	Assigning missing values with the MISSEVER option	49
15	Reading data with column-style of input	50
16	Reading data with formatted-style of input	50
17	Specifying the maximum number of input records to read	51
18	Specifying the first input record to read	51
19	Using column pointers with formatted-style of input	52
20	Specifying the number of lines available to the input pointer	52
21	Using line pointers with formatted-style of input	52
22	Holding an input record	53

23	Reading carriage-control characters from an input file	54
24	Assigning an error condition to missing input data values	54
25	Reading the next input record with the FLOWOVER option	54
26	Concatenating and reading multiple input files	55
27	Another example of concatenating and reading multiple input files	55
28	Reading from multiple input files with the EOF option	56
29	Identifying the last record in an input file	56
30	Conditionally executing input files	56
31	Specifying a logical record length	57
32	Reading records padded with blanks	57
33	Sharing input and output buffers	57
34	Reading hierarchical files	57
35	Accessing External File Interface (EFI)	58
36	Importing delimited files with EFI	58
37	Accessing data from other applications with DDE	62
38	Accessing the DDE triplet with Microsoft Excel	62
<i>SAS Data Objects</i>		63
1	Associating a libref with a SAS library	63
2	Another way of referencing a permanent SAS data set	63
3	Listing librefs currently defined in a session	63
4	Exploring SAS engines	64
5	SAS/ACCESS engines	64
6	Reading SAS data sets sequentially	65
7	Reading from multiple SAS data sets	65
8	Starting at the nth observation	65
9	Stopping at the nth observation	65
10	Setting a range for reading observations	66
11	Understanding the Program Data Vector (PDV)	66
12	Understanding the difference between a subsetting IF and WHERE	66
13	Subsetting observations with WHERE	67
14	Selecting variables	67
15	Renaming variables	68
16	Understanding a WHERE expression's processing order	68
17	Executing WHERE expressions with BY groups	68
18	Creating an end-of-file indicator	69
19	Determining the number of observations in an input data set	69
20	Reading SAS data sets directly	70
21	Reading a SAS data set into real memory	70
22	Specifying the number of buffers	70
23	Specifying a data set's level of access	71
24	Reading a generation data set (GENNUM=)	71
25	Accessing data from a view	71
26	Understanding dictionary views	71

27	Exploring the types of dictionary views	71
28	Accessing dictionary views	72
29	Identifying the number of observations in a data set with VTABLE	73
30	Reading catalog source files	73
	<i>Structured Query Language (SQL) Procedure</i>	73
1	Programming with SQL	73
2	Understanding ANSI SQL and PROC SQL extensions	74
3	Bundling the SQL procedure with the Base-SAS product	74
4	Remaining active until a QUIT; statement is issued	74
5	Processing with RUN groups and the handling of errors	74
6	Storing separate pieces of information in a data set or table	74
7	Understanding columns and datatypes	75
8	Understanding SQL statements and clauses	75
9	Ordering of columns and a column wildcard	75
10	Specifying criteria to subset and display values	75
11	Understanding parentheses and order of evaluation in SQL	75
12	Understanding SELECT clause ordering	76
13	Using too many wildcards and processing time	76
14	Using caution in the placement of wildcard characters	77
15	Inserting a blank line between each row of output	77
16	Assigning clarity to column names with aliases	77
17	Removing rows containing duplicate column values	77
18	Sorting data by multiple columns	78
19	Sorting data in descending order in SQL	78
20	Sorting by relative position in the select list	79
21	Sorting columns not specified in a select list	79
22	Calculating statistics with summary functions	79
23	Using SQL to summarize data	79
24	Summarizing data down rows	79
25	Summarizing data across columns	80
26	Exploring summary functions	80
	<i>Summary</i>	81
	 Chapter 3 DATA Step Programming	83
	 <i>The DATA Step Programming Language</i>	83
1	Understanding the DATA step language	83
2	Understanding DATA step features and capabilities	84
3	DATA step processing begins with the DATA statement	84
4	Understanding the observation loop	85
5	Revisiting the Program Data Vector (PDV)	85
6	Setting variables to missing at the top of an observation loop	85
7	Implying a RETURN to the top of an observation loop	86

8	Stopping an observation loop	86
9	Aborting a step	86
10	Branching at end-of-file	87
11	Returning to the top of the observation loop	87
12	Retaining values across observation loops	88
13	Preventing missing values from being assigned to a variable	88
14	Assigning a variable's length with a LENGTH statement	88
15	Assigning a variable's attributes with the ATTRIB statement	89
16	Changing the length of an existing character variable	89
17	Executing WHEN conditions in a SELECT statement	90
18	Counting with counters	90
19	Looping inside an observation loop	91
20	Specifying an indexed DO loop	91
21	Specifying a DO WHILE loop	91
22	Specifying a DO UNTIL loop	91
23	Best practices coding standards	91
<i>Date and Time Processing</i>		93
1	Storing dates as a numeric value	93
2	Handling valid SAS dates	93
3	Storing time as a numeric value	94
4	Representing dates and time values with formats and informats	94
5	Applying date and time formats	94
6	Applying a date format in a PUT statement	94
7	Applying a date format in a PUT function	95
8	Applying a date format with a FORMAT statement	95
9	Applying a date format with an ATTRIB statement	95
10	Applying a date format in an SQL SELECT statement	96
11	Defining a one-hundred-year period with the YEARCUTOFF= option	96
12	Understanding date formats	97
13	Understanding date informats	99
<i>Operators and Modifiers</i>		101
1	Understanding operators and their order of evaluation	101
2	Understanding mathematical operators in SQL	102
3	Combining comparison and logical operators	102
4	Negating a specified condition with the NOT operator	102
5	Using the IN operator to group equality tests	103
6	Subsetting with the percent sign (%) wildcard and the LIKE operator	103
7	Using multiple percent sign (%) wildcards in a search pattern	104
8	Using the underscore (_) wildcard with the LIKE operator	104
9	Truncating and comparing strings with a colon (:) modifier	104
10	Reading input values with the n* informat modifier	105
11	Writing values with the n* format modifier	105

<i>SAS Functions</i>	106
1 Using functions as part of a SAS statement	106
2 Searching a character variable for a character string	106
3 Reversing a character-string value	107
4 Exploring host operating system functions	107
5 Exploring arithmetic functions	107
6 Exploring array functions	107
7 Exploring character functions	107
8 Exploring date and time functions	110
9 Exploring financial functions	110
10 Exploring random number functions	110
11 Exploring state and ZIP code functions	110
12 Exploring statistical functions	110
13 Exploring trigonometric and hyperbolic functions	110
14 Exploring truncation functions	117
15 Exploring Web tool functions	117
<i>Program Testing</i>	118
1 Understanding the program testing process	118
2 Testing participants	119
3 Programming errors and their causes	119
4 Understanding the purpose of testing	119
5 Exploring defects in programs	119
6 Determining if a program defect will result in a failure	119
7 Exploring problems related to data	119
8 Exploring the types of testing a program should endure	120
9 Understanding test categories	120
10 Exploring test objectives and test strategies	120
<i>Program Debugging</i>	122
1 Reading the SAS Log to aid in error detection	122
2 Understanding SAS software usage errors	122
3 Violating syntax	122
4 Checking for syntax errors	122
5 Warnings, warnings, and more warnings	123
6 Using the Enhanced Editor to alert you to coding problems	123
7 Enabling and Disabling the Enhanced Editor	123
8 Enabling the Enhanced Editor	123
9 Checking for coding errors with the Enhanced Editor	123
10 Opening the Enhanced Editor Options window	124
11 Customizing Enhanced Editor general options	124
12 Customizing Enhanced Editor Appearance options	124
13 Opening Enhanced Editor Keyboard shortcuts	124
14 Exploring Enhanced Editor navigation keyboard shortcuts	124
15 Understanding data-related errors	125

16	Understanding system-related errors	125
17	Understanding programming (logic) errors	125
18	Getting the SAS interpreter to recognize SAS statements	125
	<i>Processing Large Files</i>	126
1	Avoiding problems related to sorting	126
2	Reversing the order of a data set without sorting	127
3	Creating subsets	127
4	Dividing data in BY-groups	127
5	Replacing subsetting IFs with WHEREs	128
6	Creating summary statistics	128
	<i>Documentation</i>	130
1	Documenting a program with comments	130
2	Using comments in a program	131
3	Understanding that comments are non-executable	131
4	Inserting in-stream comments	131
5	Saving labels and formats in SAS data sets	131
	<i>Summary</i>	132
	 Chapter 4 Data Manipulation	133
	<i>Subsetting Data</i>	133
1	Creating new data sets with a subset	133
2	Subsetting IF	134
3	Subsetting observations with a WHERE= data set option	134
4	Subsetting observations with operators	134
5	Subsetting observations with a DELETE statement	136
6	Subsetting observations with IF-THEN/ELSE and OUTPUT	136
7	Subsetting observations with OBS= and FIRSTOBS= data set options	137
8	Subsetting external input data with OBS= and FIRSTOBS= options	138
9	Subsetting observations with SELECT blocks and OUTPUT	138
	<i>Reshaping Columns of Data</i>	139
1	Understanding what reshaping data means	139
2	Subsetting variables from external data	139
3	Subsetting variables in a DATA step	139
4	Subsetting variables in a PROC step	140
5	Creating unique variable subsets for individual data sets	140
6	Concatenating SAS data sets in the DATA step	141
7	Concatenating SAS data sets with the APPEND procedure	141
8	Specifying the BASE= option in APPEND procedure	142
9	Creating the BASE= data set in the APPEND procedure	142
10	Understanding how the BASE= option works	142
11	Omitting the BASE= or DATA= option with the APPEND procedure	142
12	Using the FORCE option	142

13	Missing values in the APPEND procedure	142
14	Renaming a BASE= data set	142
15	Reshaping data with two SET statements	143
16	Reshaping data with three SET statements	144
17	Interleaving SAS data sets	144
18	Overcoming the interleaving threshold	145
19	Using FIRST. and LAST. Variables	145
20	Outputting the values of FIRST. and LAST. variables to a data set	145
21	Combining data with one-to-one merging	145
22	Applying caution when using one-to-one merges	146
23	Combining data with match merging	146
24	Understanding SAS and SQL terminology	148
25	Understanding why joining is important	148
26	Combining data with an SQL join	148
27	Creating a Cartesian Product join	148
28	Creating table aliases when joining	149
29	Combining three or more tables with an SQL join	150
30	Understanding outer joins	151
31	Exploring tasks with an outer join	151
32	Deciding on a left or right outer join	151
33	Combining data with a left outer join	151
34	Combining data with a right outer join	153
	<i>Sending Output to SAS Data Sets</i>	154
1	Sending output to a data set	154
2	Creating an output data set with a subsetting IF statement	154
3	Creating an output data with an IF-THEN/ELSE statement	154
4	Creating an output data set with WHEN conditions	155
5	Creating an output data set with the CONTENTS procedure	155
6	Exploring an output data set created with the CONTENTS procedure	155
7	Creating an output data set with the FREQ procedure	156
8	Exploring the available statistics with the FREQ procedure	156
9	Sending output to a data set with the MEANS procedure	157
10	Exploring the available statistics with the MEANS procedure	158
11	Sending output to a data set with the SUMMARY procedure	158
12	Sending output to a data set with the UNIVARIATE procedure	159
13	Exploring the available statistics with the UNIVARIATE procedure	160
14	Tracing output objects with ODS	160
15	Sending output to a data set with ODS	161
16	Converting observations into variables	162
17	Converting variables to observations	163
	<i>Summary</i>	164

Chapter 5 Data Management	165
<i>Copying Data</i>	165
1 Copying data files	165
2 Verifying FIRSTOBS= and OBS= System options are assigned	166
3 Copying text files in a DATA step	166
4 Copying part of each record in a text file	166
5 Copying text files starting in a designated record position	167
6 Specifying the LENGTH= and START= options when copying text files	167
7 Making multiple copies of text files	168
8 Copying SAS data sets in a DATA step	168
9 Exploring the advantages of DATA step copying	168
10 Selecting data sets to copy	168
11 Copying SAS files with the COPY procedure	169
12 Copying SAS Data sets – DATASETS Procedure syntax	169
13 Copying SAS data sets with the DATASETS procedure	170
<i>Describing Data</i>	170
1 Exploring the CONTENTS procedure output	170
2 Printing a list of SAS library data sets	171
3 Suppressing the printing of individual files in SAS libraries	172
4 Printing a contents “short” list	173
5 Printing an alphabetical list of variables	174
<i>Sorting Data</i>	175
1 Returning sorted observations to the original SAS data set	175
2 Saving sorted observations to a data set	175
3 Understanding the sort order for numeric variables	175
4 Understanding the sort order for character variables	175
5 Selecting observations to sort	176
<i>Managing Data</i>	176
1 Accessing SAS data libraries	176
2 Exploring SAS Libraries	177
3 Exploring SAS member types	177
4 Storing SAS libraries on disk	177
5 Storing SAS libraries on tape	178
6 Reading data sets from two or more tapes	178
7 Renaming variables	178
8 Modifying a data set’s attributes	179
9 Modifying a variable’s label	179
10 Updating a SAS data set with the UPDATE statement	180
11 Aging a SAS data set	181
12 Reading a generation data set (GENNUM=)	181
13 Managing SAS data sets with the APPEND procedure	182
14 Specifying the larger data set as the BASE= data set	182

15	Creating the BASE= data set automatically	182
16	Using the FORCE option	182
17	Exploring single-level data set names	182
18	Handling missing values in the APPEND procedure	182
19	Concatenating two or more data sets with the APPEND procedure	183
20	Renaming a base data set	183
21	Concatenating two or more data sets in a DATA step	183
22	Removing all SAS files in a library	183
	<i>Summary</i>	184
 Chapter 6 Data Presentation		185
	<i>Report Writing and PROC PRINT</i>	185
1	Suppressing the observation number in PROC PRINT output	185
2	Writing a blank line between observations in PROC PRINT	186
3	Controlling the orientation of column headings in PROC PRINT	186
4	Printing labels as column headings in PROC PRINT	187
5	Breaking column headings	187
6	Printing the number of observations at the end of a report	188
7	Printing the number of observations in BY group in a report	188
8	Printing output consistently page-by-page	189
9	Conserving CPU time with the FULL option	189
10	Printing a blank column header	190
	<i>Custom Report Writing with the DATA Step</i>	190
1	Understanding the advantages of “custom” report writing	190
2	Specifying _NULL_	190
3	Printing headings at the top of each page	190
4	Suppressing the printing of the default SAS title	191
5	Knowing when the end-of-file has occurred	191
6	Counting the number of lines left on a page	191
7	Creating two reports in a single DATA step	192
8	Creating two-column output in the DATA step	192
9	Creating three-column output in the DATA step	193
10	Creating four-column report output in the DATA step	193
	<i>Output Delivery System (ODS)</i>	194
1	Understanding the advantages of the Output Delivery System (ODS)	194
2	Using an earlier version of SAS software	194
3	Formatting output with global ODS statements	194
4	Opening and closing destinations	195
5	Managing system resources	195
6	Understanding the difference between batch and interactive use	195
7	Tracing procedure output	196
8	Selecting output with ODS	197

9	Selecting desired output objects	197
10	Deleting output from the Results window	197
11	Creating the standard “monospace” Listing file	198
12	Creating output data sets	198
13	Creating RTF	198
14	Creating PostScript output	199
15	Assigning a default name to a PostScript file	199
16	Specifying a PostScript name	199
17	Integrating ODS into the DATA step	200
18	Locating SAS-supplied format templates	200
	<i>Output Delivery Goes Web</i>	201
1	Distributing content anywhere and anytime	201
2	Understanding HTML	201
3	Exploring links and references in ODS	202
4	Exploring ODS HTML file types	202
5	Deploying output to the Web with ODS	203
6	Streaming (continuous) output with a BODY= file	203
7	Viewing the frame file	204
8	Ignoring pagesize and linesize settings	204
9	Locating HTML files (Windows operating system)	204
10	Displaying PRINT procedure output in HTML format	205
11	Specifying BODY=, CONTENTS=, PAGE=, and FRAME= files	205
12	Changing output labels	206
13	Combining output results	206
14	Creating PDF output	207
15	Exploring the drill-down user interface	208
16	Building drill-down applications	209
17	Coding a drill-down application	209
18	Testing Web output	211
19	Checking the Web deployment checklist	211
	<i>Summary</i>	212

Chapter 7 Efficiency and Performance213

	<i>Planning</i>	213
1	Planning is everything	213
2	Understanding what is meant by efficiency	214
3	Exploring the problem of competing resources	214
4	Developing a simple plan	215
5	Applying simple strategies one at a time	216
6	Striving for an “optimal” balance	216

<i>CPU Techniques</i>	216
1 Treating CPU and elapsed time as baseline measurements	216
2 Subsetting IF	217
3 Understanding the efficiencies of WHERE processing	217
4 Using IF-THEN/ELSE	217
5 Using the IN operator	217
6 Concatenating SAS data sets	218
7 Turning off the Macro facility	218
8 Avoiding unnecessary sorting	218
9 Controlling the amount of memory used for sorting	219
10 Using a CLASS statement in procedures	219
11 Compressing and uncompressing data sets is CPU intensive	219
12 Creating an index	219
13 Using LIBNAME engines	220
14 Using temporary arrays	220
15 Using the Stored Program Facility	220
<i>I/O Techniques</i>	220
1 Storing data as data sets	220
2 Subsetting observations	220
3 Creating subsets earlier than later	220
4 Reducing the number of steps	220
5 Copying indexes	220
6 Specifying the BASE= option in the APPEND procedure	221
7 Using SQL to consolidate steps	221
8 Sorting only what is needed	221
<i>Memory Techniques</i>	221
1 Reading only data that is needed	221
2 Using KEEP= or DROP= dataset options	221
3 Deleting WORK data sets	222
4 Reducing memory requirements with WHERE processing	222
5 Handling large data sets	222
<i>Storage Techniques</i>	222
1 Using DATA _NULL_ to suppress the creation of a data set	222
2 Using KEEP= or DROP= dataset options	223
3 Assigning lengths to numeric variables	223
4 Compressing data sets	223
5 Creating user-defined formats for coded data	223
<i>Programming Techniques</i>	223
1 Including RUN statements	223
2 Assigning descriptive variable and data set names	223
3 Saving labels and formats in SAS data sets	223
4 Assigning a length to character variables	224
5 Documenting programs and program code	224

6	Storing data set informats, formats, and labels	224
7	Creating views	224
8	Avoiding FORCE with indexes	225
9	Coding for harmful data conditions	225
10	Specifying NOREPLACE	225
11	Specifying SAS System options to control messaging	225
	<i>Summary</i>	226

Chapter 8 Configuration and Support227

	<i>Installation and Configuration</i>	227
1	Exploring Release 8.2 system requirements	227
2	Installing Internet Explorer 5 in SAS Release 8.2 for Windows	229
3	Removing Internet Explorer 5 in SAS Release 8.2 for Windows	229
4	Launching the SAS System installation process	229
5	Changing SAS System library locations	229
6	Choosing between different installation configurations	230
7	Invoking the SAS System	230
8	Discovering the SAS System's Configuration startup file	230
9	Customizing the SAS Configuration file	230
10	Listing of System options under the Windows operating system	231
	<i>The Service & Support Web Site</i>	233
1	Accessing the Service & Support Web site	233
2	Searching techniques	233
3	Narrowing your search results with Boolean search operators	234
4	Searching by search categories	234
5	Contacting SAS technical support	235
6	Searching technical notes for programming problems	235
7	Accessing Maintenance Bug Fix documentation	236
8	Finding Hot Fixes	236
9	Upgrading SAS Release 8.1 to 8.2 under Windows and Hot Fixes	237
10	Applying the SAS System Version 8 SETINIT under Windows	237
11	Handling SETINIT problems during SAS Release 8.2 installation	237
12	Applying a SETINIT when the SAS System has expired	238
13	Accessing a library of sample SAS programs	238
14	Downloading demos and examples	239
15	Subscribing to the SAS-L email list	239
16	Participating in SAS-L	239
17	Unsubscribing from SAS-L	240
18	Exploring the world of SAS user groups	240
19	Attending SUGI—the event no SAS user should miss	240
	<i>Summary</i>	240

Chapter 9 New Version 9 Features	241
<i>The DATA Step</i>	<i>241</i>
1 Performing faster searches and text replacement with Perl Regular Expressions (PRXs) ...	241
2 Describing PRXs and metacharacters	241
3 Getting started with a simple match	242
4 Performing another simple match with PRX	242
5 Parsing data with regular expressions	242
6 Finding data with regular expressions	243
7 Retrieving text with regular expressions	243
8 Searching and replacing text	243
9 Exploring other PRX functions	243
<i>Output Delivery System (ODS)</i>	<i>243</i>
1 Understanding ODS MARKUP	243
2 Exploring ODS MARKUP file types	244
3 Obtaining a list of tagset names	244
4 Creating HTML output with MARKUP	245
5 Creating XML output with MARKUP	245
6 Understanding Document Type Definitions (DTDs)	246
7 Creating an XML output and DTD with MARKUP	247
8 Combining MARKUP output	247
9 Using ODS to get “page xx of yy” page numbering	247
<i>SAS Macro Facility</i>	<i>248</i>
1 Exploring new Version 9 Macro statements	248
2 Exploring new Version 9 Macro options	248
<i>One More Tip</i>	<i>248</i>
1 Learning made easy with the SAS Learning Edition	248
<i>Summary</i>	<i>249</i>
 Appendix SAS System Options.....	251
Index.....	263