

# Index

- A**
- access descriptors 461
  - access methods, combining SAS data sets 322
  - accessing data with views, performance optimization 247
  - action statements 80
  - aliases, informats 74
  - ampersand (&), reading raw data 291
  - AND operator 141
  - APPEND procedure 326
  - arithmetic operators
    - summary table of 138
    - WHERE-expression processing 233
  - array bounds
    - determining 377
    - specifying 377, 378
  - array processing 368
  - array reference 368
  - ARRAY statement 369
  - arrays, examples 379
  - arrays, multi-dimensional 368
    - grouping variables 375
    - processing with nested DO loops 375
    - two dimensional 368
    - two dimensional, specifying bounds 378
  - arrays, one-dimensional 367, 368
    - defining with variable lists 374
    - defining, syntax for 369
    - DO UNTIL expressions 374
    - DO WHILE expressions 374
    - functions for 51
    - grouping variables as 370
    - number of elements, defining 372
    - number of elements, determining 373
    - processing with DO loops 370
    - referencing, rules for 373
    - referencing, syntax for 369
    - selecting the current variable 371
  - assignment statement 103
  - asterisk, referencing arrays 373
  - ATTRIB statement
    - creating variables 105
    - specifying formats 30
    - specifying informats 68
  - audit files 400
  - audit trails 414, 415
    - benefits of 414
    - capturing rejected observations, example 421
    - controlling 418
    - data file update, example 420
    - defining user variables 418
    - determining status of 416
    - fast-append 417
    - initiating 417, 418
    - limitations 417
    - operation 416
    - passwords 510
    - performance 416
    - reading 416
  - autoexec files 9
  - automatic naming convention 403
  - automatic variables 107
- B**
- backup files 400
  - base version 404
  - batch mode 8
  - BETWEEN-AND operator 235
  - big endian platforms
    - formats 31
    - informats 69
  - binary data, reading as raw data 297
  - binary informats, reading raw data 298
  - bit masks 135
  - bit testing constants 135
  - bitwise logical operators 51
  - Boolean numeric expressions 142
  - Boolean operators 140
  - buffers, I/O performance optimization 248
  - BUFNO= system option 248
  - BUFSIZE= system option 248
  - BY statement 326
  - BY-group processing 227, 303, 309
    - FIRST.variable 304, 308
    - groups by formatted values 311
    - groups in ascending order 310
    - groups in descending order 311
    - groups in no order 311
    - identifying BY groups 308
    - invoking 306
    - LAST.variable 304, 308
    - preprocessing, determining need for 306
    - preprocessing, indexing 307
    - preprocessing, sorting 307
    - syntax 304
    - with multiple BY variables 305
    - with single BY variable 305
  - BYERR system option 195
  - byte ordering
    - formats 31
    - informats 69
- C**
- CALL routines
    - character string matching 51
    - definition 44
    - external routines 51
    - macros 51
    - pattern matching 51
    - random number routines 51
    - random-number generation, examples 49
    - random-number generation, overview 48
    - seed values 48
    - summary table 51
    - syntax 45
    - variable control 51
  - catalog directory windows 480
  - CATALOG procedure
    - library management 395
    - managing SAS catalogs 480
  - CATALOG window 480
  - CATCACHE= system option 248
  - CENTER system option 204
  - CEXIST function 480
  - character comparisons in expressions 140
  - character constants in expressions 132, 133
  - character data, reading as raw data 288
  - character formats 36
  - character informats 75
  - character operations, functions for 51
  - character string matching, functions and CALL routines 51
  - character variables 100
  - colon
    - in character comparisons 234
    - reading raw data 291
  - column binary informats 75
  - column-binary data, reading 299
  - comparison operators
    - expressions 138
    - WHERE-expression processing 233
  - compound expressions 132
  - COMPRESS= data set option 454
  - COMPRESS= system option 248, 454
  - compressed data files 454

- concatenating SAS catalogs 481
  - explicit 483
  - implicit 482
  - rules for 484
- concatenating SAS data libraries
  - definition 390
  - library members 390
  - rules for 391
- concatenating SAS data sets 323, 330
  - examples 330
- concatenation operators 143, 238
- configuration files 8
- constants, WHERE expressions 232
- CONTAINS operator, WHERE expressions 235
- control statements 80
- CPU performance 249
- CPUID system option 201
  
- D**
- data access statements 84
- data errors 190
- data processing, SAS system options for 91
- data relationships, SAS data sets 319
- data set options 23
  - COMPRESS= 454
  - FIRSTOBS= 246
  - GENMAX= 404
  - GENNUM= 404
  - IDXNAME= 445
  - IDXWHERE= 445
  - IN= 105
  - interaction with system options 24
  - OBS= 246
  - summary table of 24
  - syntax 23
  - versus SAS system options 91
  - WHERE= 269
  - with SAS data sets 24
- data set size, calculating 250
- DATA step 6, 259
  - assigning passwords 504
  - compilation phase 262
  - creating variables 103
  - descriptor information 262
  - execution phase 262
  - flow of action 260
  - input buffer 262
  - input data 13
  - output 13
  - output structure with ODS 282
  - program data vector (PDV) 262
- DATA step debugger 4, 196
- DATA step functions, within macro functions 47
- DATA step statements, summary table 80
- DATA step views 456
  - creating 456
  - examples 457, 458
  - passwords 509
  - performance 458
  - restrictions and requirements 458
  - uses for 457
  - versus PROC SQL views 462
  - versus stored and compiled DATA step programs 457, 472
- DATA step, execution sequence
  - default 268
  - default, changing for a given observation 269
  - default, changing with functions 269
  - default, changing with statements 269
  - language elements affecting 269
  - step boundaries 271
  - stopping 272
- DATA step, report writing
  - customized reports 278
  - without creating a data set 277
- DATA step, walkthrough
  - execution phase, ending 267
  - input buffer, creating 263
  - program data vector (PDV), creating 263
  - reading a record 264, 266
  - sample DATA step 263
  - writing an observation 265
- database management system files 6
- DATASETS procedure 395
- date and time intervals 162
  - boundaries 165
  - by category 163
  - multi-unit 167
  - multi-week 168
  - shifted 168
  - single-unit 166
  - syntax 162
- DATE system option 203, 204
- dates and times 34
  - calculating date values 155
  - character dates, converting 179
  - date constants in expressions 134
  - displaying 154
  - duration 162, 164
  - expanding in external files 178
  - external dates, converting to internal 172
  - formats 36, 149
  - functions for 51
  - informats 75, 149
  - international formats 156
  - numeric dates, converting 180
  - on output listings 204
  - packed Julian formats 34
  - packed Julian informats 72
  - reading 155
  - SAS date value 147
  - storing date values 172
  - time constants in expressions 134
  - time values 148
  - tools, summary table of 149
  - writing 155
  - Y2K problem 171
  - Y2K problem, and data integrity 175
- Y2K problem, corrective strategies 176
- Y2K problem, example 176
- Y2K problem, potential problem areas 174
- Y2K problem, tools for 175
- year 2000 148
- YEARCUTOFF= system option, century cut-off 148
- YEARCUTOFF= system option, example 173
- YEARCUTOFF= system option, reading two-digit years 172
- years (two-digit and four-digit), example 173
- years (two-digit and four-digit), reading 148
- years (two-digit), reading 172
- datetime constants in expressions 134
- datetime values 148
- DBCS (double-byte character set) 251
  - converting between encoding schemes 254
  - DATA step functions for 254
  - encoding 251
  - formats 36
  - functions for 51
  - informats 75
  - limitations 252
  - on a mainframe 253
  - requirements for SAS System 252
  - shift out/shift in (SO/SI) codes 253
  - split DBCS character strings 254
  - uses for 252
  - when to use 253
- debugger 4, 196
- debugging 183
  - data errors 190
  - DATA step debugger 4, 196
  - error checking options 195
  - execution-time errors 187
  - format modifiers for 192
  - log control options for error checking 196
  - macro-related errors 192
  - multiple errors 193
  - out-of-resources condition 188
  - return codes 195
  - semantic errors 186
  - syntax check mode 192
  - syntax errors 184
  - system options for 194
- declarative statements 79
- default data sets 403
- DELETE statement 269
- descriptive statistics, functions for 51
- descriptor information 400
- DETAILS system option 395
- DICTIONARY tables 475
  - viewing, entire table 476
  - viewing, table subsets 476
  - viewing, table summaries 476
- direct access method, combining SAS data sets 322
- display, SAS system options for 91
- DKRCOND= system option 195
- DKROCOND= system option 195

- DO loops 269
  - DO UNTIL expressions 374
  - DO WHILE expressions 374
  - dollar sign, reading raw data 288, 290, 292
  - double-precision versus single precision 120
  - driver settings, SAS system options for 91
  - DROP statement 246
  - DSNFERR system option 195
- E**
- ECHOAUTO system option 201
  - EFI (External File Interface) 286
  - encryption 91, 509
  - engine efficiency 247
  - EOF= option, INFILE statement 269
  - equal sign (=), reading raw data 293
  - error checking, combining SAS data sets
    - examples 358
    - importance of 357
    - sources of problems 328
    - tools for 328, 357
  - error handling, SAS system options for 91
  - error processing 183
    - data errors 190
    - DATA step debugger 4, 196
    - error checking options 195
    - execution-time errors 187
    - format modifiers for 192
    - log control options for error checking 196
    - macro-related errors 192
    - multiple errors 193
    - out-of-resources condition 188
    - return codes 195
    - semantic errors 186
    - syntax check mode 192
    - syntax errors 184
    - system options for 194
  - ERROR statement 201
  - ERROR= system option 195
  - ERRORABEND system option 195
  - ERRORCHECK system option 195
  - ERRORS= system option
    - customizing SAS log contents 201
    - debugging programs 195
  - \_ERROR\_ variable 107
  - exclusion lists 208
  - executable statements 79
  - executables programs, reducing search time for 250
  - execution-time errors 187
  - expressions 131
    - AND operator 141
    - arithmetic operators 138
    - automatic numeric-character conversion 136
    - bit masks 135
    - bit testing constants 135
    - Boolean numeric expressions 142
    - Boolean operators 140
    - character comparisons 140
    - character constants 132
    - comparing character constants to character variables 133
    - comparison operators 138
    - compound expressions 132
    - concatenation operator 143
    - date constants 134
    - datetime constants 134
    - functions 137
    - hexadecimal notation 133, 134
    - infix operators 137
    - logical operators 140
    - MAX operator 143
    - MIN operator 143
    - NOT operator 142
    - numeric comparisons 139
    - numeric constants 134
    - operands 132
    - operators 132, 137
    - OR operator 141
    - order of evaluation 144
    - prefix operators 137
    - SAS constants 132
    - scientific notation 134
    - standard notation 134
    - time constants 134
    - truncation 135
    - variables 136
    - WHERE expressions 146
  - External File Interface 286
  - external files 5, 525
    - DATA step output 13
    - functions for 51
    - input to SAS programs 12
    - processing 530
    - reading 529
    - reading raw data from 290
    - referencing directly 526
    - referencing indirectly 526
    - referencing multiple files 527
    - referencing with filerefs 528
    - SAS system options for 91
    - writing 529
  - external routines 51
- F**
- FILE command 206
  - FILE statement 203
  - File Transfer Protocol (FTP) 12
  - file-handling statements 80
  - FILENAME statement 206
  - files, SAS system options for 91
  - financial functions 51
  - FIRST.variable 304, 308
  - FIRSTOBS= data set option 246
  - floating point precision 112
    - computations on fractions 116
    - double-precision versus single precision 120
    - IBM mainframes 113
    - IEEE standard 115
    - minimum storage length 119
    - numeric comparisons 117
    - OpenVMS 115
    - transferring between operating systems 120
    - truncating during comparisons 119
    - truncating on storage 117
    - versus magnitude 116
  - FMTERR system option 195
  - FOOTNOTE statement 204
  - footnotes, traditional listing output 204
  - format modifiers, for error reporting 192
  - FORMAT statement
    - creating variables 104
    - specifying formats 29
  - format, variable attribute 101
  - formats 27
    - big endian platforms 31
    - byte ordering 31
    - character 36
    - date and time 36
    - dates and times 149
    - DBCS 36
    - integer binary notation 32
    - little endian platforms 31
    - nibbles 33
    - numeric 36
    - packed decimal data 33
    - packed decimal data, languages supporting 34
    - packed decimal data, platforms supporting 34
    - packed decimal data, summary table 35
    - packed Julian dates 34
    - permanent associations 30
    - summary table 36
    - syntax 27
    - temporary associations 30
    - user-defined formats 30
    - zoned decimal data 33
    - zoned decimal data, languages supporting 34
    - zoned decimal data, platforms supporting 34
    - zoned decimal data, summary table 35
  - formats, specifying
    - ATTRIB statement 30
    - FORMAT statement 29
    - PUT function 29
    - PUT statement 29
    - %QSYSFUNC macro 29
    - %SYSFUNC macro 29
  - FORMCHAR= system option 204
  - FORMDLIM= system option 204
  - fractions, floating point precision 116
  - FTP (File Transfer Protocol) 12
  - FULLSTIMER system option 244
  - fully-bounded range condition 234
  - functions 43
    - argument restrictions 45
    - arrays 51
    - bitwise logical operators 51

CEXIST 480  
 changing DATA step execution sequence 269  
 character operations 51  
 character string matching 51  
 DATA step functions within macro functions 47  
 date and time 51  
 DBCS 51  
 depreciation 47  
 descriptive statistics 46, 51  
 external files 51  
 external routines 51  
 file manipulation 48  
 financial 46  
 GETOPTION 88  
 HBOUND, determining array bounds 377  
 HBOUND, versus DIM function 378  
 in expressions 137  
 INPUT 67  
 KCOMPRESS 254  
 KCOUNT 254  
 KINDEX 254  
 KLEFT 254  
 KLENGTH 254  
 KLOWCASE 254  
 KREVERSE 254  
 KRIGHT 254  
 KSCAN 254  
 KSTRCAT 254  
 KSUBSTR 254  
 KSUBSTRB 254  
 KTRANSLATE 254  
 KTRIM 254  
 KTRUNCATE 254  
 KUPCASE 254  
 KUPDATE 254  
 KVERIFY 254  
 LBOUND 377  
 LIBNAME 389  
 macros 51  
 pattern matching 51  
 PUT 29  
 random numbers 51  
 random-number generation 48, 50  
 reading raw data 286  
 seed values 48  
 summary table 51  
 syntax 44  
 SYMSG 195  
 SYSRC 195  
 target variables 46  
 WHERE-expression processing 232

## G

general constraints 423  
 generation data sets 404  
   appending 408  
   base version 404

copying 408  
 deleting versions 409  
 displaying data set information 408  
 generation group 404  
 generation number 404  
 GENMAX= data set option 404  
 GENNUM= data set option 404  
 historical versions 404, 405  
 invoking 405  
 maintaining 405  
 modifying generation number 408  
 oldest version 404  
 passwords 510  
 processing specific versions 407  
 renaming versions 409  
 rolling over 405  
 shift down 405  
 shift up 405  
 youngest version 405  
 generation groups 404  
 generation numbers 404  
 GENMAX= data set option 404  
 GENNUM= data set option 404  
 GETOPTION function 88  
 global statements 84  
 GO TO statement 269

## H

HBOUND function  
   determining array bounds 377  
   versus DIM function 378  
 HEADER= option, FILE statement 269  
 hexadecimal notation in expressions 133, 134  
 historical versions 404, 405  
 Hollerith code 300  
 HTML files, DATA step output 13  
 hyperbolic functions 51

## I

IDXNAME= data set option 445  
 IDXWHERE= data set option 445  
 IEEE standard, floating point precision 115  
 IF/THEN/ELSE statement 269  
 Import Wizard 286  
 IN= data set option 105  
 IN operator 234  
 index type, variable attribute 102  
 indexes 400, 433  
   benefits of 433  
   buffer requirements 438  
   composite index 435  
   compound optimization 436  
   cost, CPU 437  
   cost, I/O 437  
   data file considerations 439

disk space requirements 438  
 for both WHERE and BY processing 448  
 for BY processing 447  
 I/O performance optimization 247  
 index file 434  
 key variable candidates 439  
 missing values 436  
 passwords 510  
 recovering 522  
 simple index 435  
 specifying for SET and MODIFY statements 448  
 types of 435  
 unique values 436  
 use considerations 439  
 indexes, creating  
   DATASETS procedure 440  
   guidelines for 439  
   INDEX= data set option 441  
 indexes, for WHERE processing 441  
   comparing resource usage 445  
   compound optimization 443  
   controlling with data set options 445  
   displaying usage information in SAS log 446  
   estimating number of observations 444  
   identifying available indexes 442  
   with views 446  
 indexes, maintaining  
   adding observations 453  
   appending to indexed data files 453  
   copying indexed data files 452  
   displaying data file information 449  
   multiple occurrences 453  
   recovering damaged indexes 453  
   sorting indexed data files 453  
   updating indexed data files 452  
 infix operators 137  
 INFORMAT statement  
   creating variables 104  
   specifying informats 67  
 informat, variable attribute 101  
 information statements 80  
 informats 65  
   aliases 74  
   big endian platforms 69  
   binary, reading raw data 298  
   byte-ordering 69  
   character 75  
   column binary 75  
   date and time 75  
   dates and times 149  
   DBCS 75  
   integer binary notation 70  
   little endian platforms 69  
   numeric 75  
   packed decimal data 71  
   packed decimal data, languages supporting 72  
   packed decimal data, platforms supporting 72  
   packed decimal data, summary table 35, 73  
   packed Julian dates 72  
   permanent associations 68

- summary table 75
- syntax 66
- temporary associations 68
- user-defined 68
- zoned decimal data 71
- zoned decimal data, languages supporting 72
- zoned decimal data, platforms supporting 72
- zoned decimal data, summary table 35, 73
- informats, specifying
  - ATTRIB statement 68
  - INFORMAT statement 67
  - INPUT function 67
  - INPUT statement 67
- input buffers, creating 263
- input data sources 12
- INPUT function 67
- INPUT statement
  - creating variables 103
  - specifying informats 67
- INPUT statement, reading raw data
  - choosing input style 290
  - column input 292
  - data-reading features, summary table of 294
  - formatted input 293
  - list input 290
  - modified list input 291
  - named input 293
- installation 91
- instream data
  - creating SAS data sets 274, 275
  - creating SAS data sets with missing values 275
  - input to SAS programs 12
  - reading raw data from 289
- integer binary notation
  - formats 32
  - informats 70
- integrity constraints 423
  - examples 428
  - general constraints 423
  - indexes and 426
  - listing 427
  - locking 427
  - preservation of 425
  - reactivating 433
  - referential constraints 423
  - rejected observations 427
  - removing 432
  - specifying 427
- interactive line mode 8
- interface files 400
- interface library engines 516
- interface view engine 517
- interleaving SAS data sets 323, 333, 334
- INVALIDDATA= system option 195
- \_IORC\_ automatic variable
  - debugging programs 195
  - error checking 357
- IS MISSING operator 236
- IS NULL operator 236

## J

- Julian dates
  - formats 34
  - informats 72

## K

- KCOMPRESS function 254
- KCOUNT function 254
- KEEP statement 246
- KEY= option 448
- KINDEX function 254
- KLEFT function 254
- KLENGTH function 254
- KLOWCASE function 254
- KREVERSE function 254
- KRIGHT function 254
- KSCAN function 254
- KSTRCAT function 254
- KSUBSTR function 254
- KSUBSTRB function 254
- KTRANSLATE function 254
- KTRIM function 254
- KTRUNCATE function 254
- KUPCASE function 254
- KUPDATE function 254
- KVERIFY function 254

## L

- LABEL statement 204
- label, variable attribute 102
- labels, on traditional listing output 204
- language control, SAS system options for 91
- LAST.variable 304, 308
- LBOUND function 377
- LENGTH statement
  - creating variables 104
  - I/O performance optimization 246
- length, variable attribute 101
- LIBNAME function 389
- LIBNAME statement, assigning/clearing librefs 389
- library directories 396
- library engines 515
  - interface library engines 516
  - interface view engines 517
  - native library engines 515
  - SAS System version compatibility 495
  - uses for 387
- library management 396
  - accessing SAS files without library references 396
- library directories 396
- operating environment commands 397
- SAS utilities 395

- sequential data libraries 397
- librefs 388
  - accessing SAS files without 396
  - assigning 388, 389
  - clearing 389
  - quoted file names 396
  - reserved names 390
- LIKE operator 236
- LINESIZE= system option 203, 204
- LINK statement 269
- LIST statement 201
- literals 15
- little endian platforms
  - formats 31
  - informats 69
- log control statements 84
- logical operators in expressions 140

## M

- macro facility 4, 6
- macro-related errors 192
- macros
  - functions and CALL routines 51
  - %QSYSFUNC 29, 47
  - SAS system options for 91
  - %SYSFUNC 29, 47
  - SYSRC autocall 357
- magnitude versus floating point precision 116
- many-to-many relationships 321
- many-to-one relationships 320
- match-merging SAS data sets 325, 344, 346
- mathematical functions 51
- MAX operator
  - in expressions 143
  - in WHERE expressions 238
- MDDB files, SAS System version compatibility 502
- memory management
  - optimizing 249
  - SAS system options for 91
- MERGE statement
  - combining SAS data sets 326
  - match-merging SAS data sets 344
  - merging SAS data sets 340
- MERROR system option 195
- MIN operator
  - in expressions 143
  - in WHERE expressions 238
- MISSING= system option 203
- missing values 123
  - character variables 126
  - checking for in a DATA step 126
  - example 124
  - from character-to-numeric conversions 129
  - from illegal operations 128
  - generated by SAS 128
  - in raw data 296

numeric variables 125  
 printing in traditional listing output 206  
 propagation in calculations 128  
 propagation, preventing 129  
 special missing values 124, 129  
 missing values, setting  
   in a DATA step 126  
   in raw data 126, 127  
   in SAS data sets 128  
 MODIFY statement  
   combining SAS data sets 326, 348  
   indexes 351  
   primary uses of 352  
   specifying indexes for 448  
   updating SAS data sets 349  
   versus UPDATE statement 351  
 MPRINT system option 201  
 MSGLEVEL= system option 196, 201  
 multi-unit date and time intervals 167  
 multi-week date and time intervals 168

**N**

name prefix, variable list 109  
 name range, variable list 109  
 name, variable attribute 101  
 naming conventions, SAS names 18  
 native files 400  
 native library engines 515  
 nesting expressions 240  
 networking, SAS system options for 91  
 NEWS= system option 201  
 nibbles 33  
 NOCENTER system option 204  
 NOCPUID system option 201  
 NODATE system option 204  
 NOECHOAUTO system option 201  
 NOMPRINT system option 201  
 noninteractive line mode 8  
 NONOTES system option 201  
 NONUMBER system option 204  
 NOOVP system option 201  
 NOPRINTMSGLIST system option 201  
 NOSOURCE system option 201  
 NOSOURCE2 system option 201  
 NOSYMBOLGEN system option 201  
 NOT operator 142  
 NOTES system option 201  
 null data sets 403  
 NUMBER system option 203, 204  
 numbered range, variable list 108  
 numbers 15  
 numeric comparisons in expressions 139  
 numeric constants in expressions 134  
 numeric data, reading as raw data 287  
 numeric formats 36  
 numeric informats 75  
 numeric variables 100  
 numeric-character conversion in expressions 136

\_N\_ automatic variable 107, 269

## O

OBS= data set option 246  
 observations 4  
 ODS (Output Delivery System) 4, 206  
   custom table definition 219  
   default table definition 209  
   destinations 208  
   exclusion lists 208  
   selecting variables for data component 211  
   selection lists 208  
   specifying column attributes 214  
 ODS printing 91  
 oldest version 404  
 one-level SAS data set names 402  
 one-to-many relationships 320  
 one-to-one merging, SAS data sets 324, 340, 341  
 one-to-one reading, SAS data sets 324, 337, 338  
 one-to-one relationships 320  
 OpenVMS, floating point precision 115  
 operands in expressions 132  
 operating environment statements 84  
 operation, SAS system options for 91  
 operators in expressions 132, 137  
 OPLIST system option 88  
 OPTIONS procedure 88  
 OR operator in expressions 141  
 order of evaluation, in expressions 144  
 order of operations, WHERE-expression processing 240  
 out-of-resources condition 188  
 output control statements 84  
 OUTPUT statement 269  
 OVP system option 201

## P

packed decimal data, formats 33  
   languages supporting 34  
   platforms supporting 34  
   summary table 35  
 packed decimal data, informats 71  
   languages supporting 72  
   platforms supporting 72  
   summary table 73  
 packed decimal data, reading as raw data 298  
 packed Julian dates  
   formats 34  
   informats 72  
 PAGE statement 203  
 PAGESIZE= system option 203, 204  
 password-protected files 506  
 passwords 503  
   audit trails 510

changing 506  
 copies 510  
 generation data sets 510  
 handling incorrect 507  
 indexes 510  
   PW= data set option 507  
   removing 506  
 passwords, assigning  
   syntax 504  
   to existing data sets 505  
   with DATA step 504  
   with procedures 505  
   with SAS windowing environment 506  
 passwords, using with views  
   DATA step views 509  
   differing levels of protection 508  
   encryption 509  
   example 510  
   PROC SQL views 508  
   SAS/ACCESS views 509  
 percent sign, in WHERE expressions 236  
 performance  
   audit trails 416  
   calculating data set size 250  
   DATA step views 458  
   optimizing CPU 249  
   optimizing memory 249  
   reducing search time for executables 250  
   SAS file management 519  
   SAS system options for 91  
   storing compiled programs 249  
   variable lengths 250  
 performance statistics 243  
   collecting 244  
   FULLSTIMER system option 244  
   interpreting 244  
   logging 244  
   STIMER system option 244  
   system performance 243  
 performance, optimizing I/O  
   accessing data with views 247  
   buffers 248  
   BUFNO= system option 248  
   BUFSIZE= system option 248  
   CATCACHE= system option 248  
   COMPRESS= system option 248  
   creating SAS data sets 246  
   DROP statement 246  
   engine efficiency 247  
   FIRSTOBS= data set option 246  
   indexes for 247  
   KEEP statement 246  
   LENGTH statement 246  
   OBS= data set option 246  
   WHERE-expression processing 245  
 period (.)  
   in format names 27  
   in informat names 66  
   representing missing values 296  
 permanent associations  
   formats 30

- informats 68
- physical names 388
- position in observation, variable attribute 102
- pound sign, in generation groups 405
- prefix operators
  - in expressions 137
  - WHERE-expression processing 238
- PRINTMSGLIST system option 196, 201
- PRINTTO statement 206
- probability functions 51
- PROC SQL views 460
  - passwords 508
  - versus DATA step views 462
- PROC steps 6, 14
- procedure output, SAS system options for 91
- procedures 4
  - APPEND 326
  - assigning passwords 505
  - CATALOG 395, 480
  - combining SAS data sets 326
  - DATASETS 395
  - OPTIONS 88
  - SQL 326
- program control statements 84
- program data vector (PDV) 262, 263
- punched cards 300
- PUT function 29
- PUT statement 201
  - specifying formats 29
  - writing to SAS log 201

## Q

- %QSYSFUNC macro
  - DATA step functions within macro functions 47
  - specifying formats 29
- quantile functions 51
- question mark, CONTAINS operator 235
- quotation marks, and character constants 132

## R

- random numbers, CALL routines
  - list of 51
  - random-number generation 48, 49
  - seed values 48
- random numbers, functions
  - list of 51
  - random-number generation 48, 50
  - seed values 48
- raw data 285
  - character data 288
  - creating SAS data sets 274
  - external files 290
  - input to SAS programs 12
  - instream data 289
  - invalid input 295

- kinds of data 286
  - missing values 296
  - numeric data 287
  - sources of 285, 289
- raw data, reading
  - binary data 297
  - binary informats 298
  - column-binary data 299
  - External File Interface (EFI) for 286
  - Import Wizard for 286
  - packed decimal data 298
  - with functions 286
  - with statements 286
- raw data, reading with INPUT statement
  - choosing input style 290
  - column input 292
  - data-reading features, summary table of 294
  - formatted input 293
  - list input 290
  - modified list input 291
  - named input 293
- referential constraints 423
- renaming files 387
- report writing, with DATA step
  - customized reports 278
  - output types 13
  - without creating a data set 277
- reserved names 18
- return codes 195
- RETURN statement 269
- rolling over 405

## S

- SAME-AND operator 237
- SAS/ACCESS views 461, 509
- SAS catalogs 479
  - accessing 480
  - input to SAS programs 12
  - managing 480
  - names 479
  - recovering 522
  - SAS System version compatibility 501
  - SASUSER.PROFILE 481
  - user profile catalog 481
- SAS constants in expressions 132
- SAS data files 4, 412
  - creating 273
  - DATA step output 13
  - input to SAS programs 12
  - recovering 521
  - SAS System version compatibility 498
  - versus data views 413
- SAS data libraries 385
  - deleting files 387
  - library engines 387
  - library management 396
  - listing files in 387
  - permanent 391
- reading 387
  - renaming files 387
  - SAS System version compatibility 497
  - temporary 391
  - writing 387
- SAS data sets 4
  - audit files 400
  - automatic naming convention 403
  - backup files 400
  - data set options 24
  - default data sets 403
  - definition 399
  - descriptor information 400
  - editing 410
  - indexes 400
  - input to SAS programs 12
  - interface files 400
  - management tools 409
  - match-merging 325, 344, 346
  - modifying 317
  - names, assigning 401
  - names, one-level 402
  - names, parts of 401
  - names, two-level 402
  - names, where to use 401
  - native files 400
  - null data sets 403
  - sorted 403
  - tools for 317
  - updating 325, 348, 352
  - viewing 410
- SAS data sets, combining 317, 319
  - access methods 322
  - appending 333
  - concatenating 323, 330
  - data relationships 319
  - direct access 322
  - error checking 357, 358
  - error-checking tools 328, 357
  - interleaving 323, 333, 334
  - many-to-many relationships 321
  - many-to-one relationships 320
  - match-merging 325, 344, 346
  - methods for 323
  - one-to-many relationships 320
  - one-to-one merging 324, 340, 341
  - one-to-one reading 324, 337, 338
  - one-to-one relationships 320
  - order 329
  - preparing data sets 328
  - problem solving 328
  - procedures for 326
  - sequential access 322
  - statements for 326
  - testing preparations for 329
  - tools for 326
  - updating 325, 348, 352
- SAS data sets, creating
  - from instream data lines 274
  - from multiple files 275

- from raw data 274
- generating data from programming statements 276
- I/O performance optimization 246
- input sources 273
- performance 246
- reading external files 274
- reading from SAS data sets 276
- reading instream data lines 274
- reading instream data lines from multiple files 275
- reading instream data lines with missing values 275
- reading raw data, examples 274
- SAS data files 273
- SAS data views 273
- with missing values 275
- SAS data sets, reading 317
  - multiple SAS data sets 318
  - observations 318
  - single SAS data sets 318
  - variables 318
- SAS data views 4, 455
  - access descriptors 461
  - benefits of 461
  - creating 273
  - DATA step output 13
  - input to SAS programs 12
  - interface views 455
  - native views 455
  - PROC SQL views 460
  - SAS/ACCESS views 461
  - view descriptors 461
- SAS date value 147
- SAS Explorer, library management 395
- SAS file I/O functions 51
- SAS file management
  - converting SAS files 520
  - moving files between operating environments 520
  - performance 519
  - recovering catalogs 522
  - recovering indexes 522
  - recovering SAS data files 521
  - repairing damaged files 520
- SAS files 4
  - accessing without librefs 396
  - converting 520
  - SAS system options for 91
- SAS I/O engines 511
  - access patterns 514
  - asynchronous I/O 515
  - characteristics 513
  - indexing 515
  - levels of locking 514
  - read/write activity 513
  - SAS files and 511
  - specifying 511
  - task switching 515
- SAS language 4
- SAS language elements 6
- SAS log 13, 197
  - customizing appearance 203
  - customizing contents 201
  - DATA step output 13
  - output, SAS system options for 91
  - redirecting output 206
  - structure 199
  - writing to 201
- SAS name literals 21
- SAS names 15, 18
  - length 18
  - naming conventions 18
  - reserved names 18
  - user-supplied 18
- SAS output 197, 198
- SAS processing 11
  - flow diagram 12
  - input data sources 12
- SAS sessions 8
  - autoexec files 9
  - batch mode 8
  - configuration files 8
  - customizing 8
  - default system option settings 8
  - executing statements at startup 9
  - interactive line mode 8
  - noninteractive line mode 8
  - starting 6
  - types of 6
  - windowing environment 7, 9
- SAS software, list of base programs 4
- SAS System 3
- SAS System libraries
  - SASHELP library 394
  - SASUSER library 394
  - USER library 393
  - WORK library 392
- SAS views, version compatibility 500
- SASHELP library 394
- SASUSER library 394
- SASUSER.PROFILE 481
- scientific notation in expressions 134
- seed values 48
- SELECT statement 269
- selection lists 208
- semantic errors 186
- semicolon, in instream data 290
- sequential access method, combining SAS data sets 322
- SERROR system option 195
- SET statement
  - combining SAS data sets 326
  - concatenating SAS data sets 330
  - interleaving SAS data sets 333
  - one-to-one reading of SAS data sets 337
  - specifying indexes for 448
- shift down 405
- shift out/shift in (SO/SI) codes 253
- shift up 405
- shifted date and time intervals 168
- single precision versus double-precision 120
- single-unit date and time intervals 166
- SKIP statement 203
- SO/SI codes 253
- sorted files 403
- sounds-like operator 237
- SOURCE system option 196, 201
- SOURCE2 system option 196, 201
- special characters 15
- special functions 51
- special SAS name, variable list 109
- split DBCS character strings 254
- SQL procedure 326
- standard notation in expressions 134
- state functions 51
- statement options versus SAS system options 91
- statements 79
  - action 80
  - ARRAY 369
  - assignment statement 103
  - blanks 17
  - BY 326
  - changing DATA step execution sequence 269
  - combining SAS data sets 326
  - continuing 17
  - control 80
  - data access 84
  - DATA step, summary table 80
  - declarative 79
  - DELETE 269
  - DROP 246
  - EOF= option, INFILE 269
  - ERROR 201
  - executable 79
  - executing at startup 9
  - FILE 203
  - file-handling 80
  - FILENAME 206
  - FOOTNOTE 204
  - global, definition 84
  - global, summary table 84
  - GO TO 269
  - HEADER= option, FILE 269
  - IF/THEN/ELSE 269
  - information 80
  - KEEP 246
  - LABEL 204
  - LINK 269
  - LIST 201
  - log control 84
  - operating environment 84
  - OUTPUT 269
  - output control 84
  - PAGE 203
  - PRINTTO 206
  - program control 84
  - %PUT 201
  - reading raw data 286
  - RETURN 269
  - SELECT 269



- SKIP 203
  - spacing 17
  - subsetting IF 241, 269
- TITLE 204
- WHERE 269
  - window display 84
- STIMER system option 244
- stored and compiled DATA step programs 465
  - creating 467, 468
  - example 472
  - restrictions and requirements 466
  - SAS processing 466
  - SAS System version compatibility 502
  - uses for 465
  - versus DATA step views 472
- stored and compiled DATA step programs, executing
  - examples 471
  - global statements 470
  - printing source code 470
  - process 469
  - redirecting output 470
  - syntax 468
- stored programs 4
- subsetting IF statement 241, 269
- SYMBOLGEN system option 201
- syntax check mode 192
- syntax errors 184
- SYSERR macro variable 195
- %SYSFUNC macro
  - DATA step functions within macro functions 47
  - specifying formats 29
- SYSMSG function 195
- SYSRC autocall macro 357
- SYSRC function 195
- SYSRC macro variable 195
- system options 87
  - BUFNO= 248
  - BUFSIZE= 248
  - BYERR 195
  - CATCACHE= 248
  - CENTER 204
  - COMPRESS= 248, 454
  - CPUID 201
  - data processing with 91
  - DATE 203, 204
  - default settings 8
  - DETAILS 395
  - display options 91
  - DKRCOND= 195
  - DKROCOND= 195
  - driver settings 91
  - DSNFERR 195
  - ECHOAUTO 201
  - encryption options 91
  - ERROR= 195
  - error handling options 91
  - error processing and debugging with 194
  - ERRORABEND 195
  - ERRORCHECK 195
  - ERRORS= 195, 201
  - external file options 91
  - file options 91
  - FMTERR 195
  - FORMCHAR= 204
  - FORMDLIM= 204
  - FULLSTIMER 244
  - initialization options 91
  - installation options 91
  - interaction with data set options 24, 90
  - INVALIDDATA= 195
  - language control options 91
  - LINESIZE= 203, 204
  - log control options for error checking 196
  - log output options 91
  - macro options 91
  - memory management options 91
  - MERROR 195
  - MISSING= 203
  - MPRINT 201
  - MSGLEVEL= 196, 201
  - networking options 91
  - NEWS= 201
  - NOCENTER 204
  - NOCPUID 201
  - NODATE 204
  - NOECHOAUTO 201
  - NOMPRINT 201
  - NONOTES 201
  - NONUMBER 204
  - NOOVP 201
  - NOPRINTMSGLIST 201
  - NOSOURCE 201
  - NOSOURCE2 201
  - NOSYMBOLGEN 201
  - NOTES 201
  - NUMBER 203, 204
  - ODS printing options 91
  - operation options 91
  - OPLIST 88
  - OVP 201
  - PAGESIZE= 203, 204
  - performance options 91
  - PRINTMSGLIST 196, 201
  - procedure output options 91
  - redirecting SAS log output 206
  - SERROR 195
  - settings, changing 88
  - settings, default 88
  - settings, determining 88
  - settings, duration of effect 89
  - settings, order of precedence 90
  - SOURCE 196, 201
  - SOURCE2 196, 201
  - STIMER 244
  - summary table of 91
  - SYMBOLGEN 201
  - syntax 87
  - versus data set options 91
  - versus statement options 91
  - VNFERR 195
  - YEARCUTOFF=, example 173
  - YEARCUTOFF=, reading two-digit years 172
  - YEARCUTOFF=, specifying century cut-off 148

## T

  - TCP/IP socket, input to SAS programs 13
  - temporary associations
    - formats 30
    - informats 68
  - tilde, reading raw data 291
  - TITLE statement 204
  - titles, in traditional listing output 204
  - traditional listing output
    - example 203
    - footnotes 204
    - labels 204
    - printing missing values 206
    - reformatting values 205
    - titles 204
  - trailing spaces, trimming 235
  - trigonometric functions 51
  - truncation
    - functions 51
    - in expressions 135
  - two-level SAS data set names 402
  - type, variable attribute 101

## U

  - underscore
    - in WHERE expressions 236
    - representing missing values 296
  - UPDATE statement
    - combining SAS data sets 326, 348
    - updating SAS data sets 349
    - versus MODIFY with BY 351
  - URLs, input to SAS programs 13
  - USER library 393
  - user profile catalog 481
  - user-defined formats 30
  - user-defined informats 68
  - user-supplied SAS names 18

## V

  - variable attributes
    - format 101
    - index type 102
    - informat 101
    - label 102
    - length 101
    - name 101
    - position in observation 102

- summary table 100
  - type 101
  - variable control CALL routines 51
  - variable information functions 51
  - variable lists 108
    - name prefix 109
    - name range 109
    - numbered range 108
    - special SAS name 109
  - variable names 20
  - variables 4, 100
    - aligning variables 106
    - automatic variables 107
    - character 100
    - \_ERROR\_ variable 107
    - in expressions 136
    - numeric 100
    - numeric precision 100
    - \_N\_ variable 107
    - type conversions 105
    - WHERE-expression processing 231
  - variables, creating
    - assignment statement 103
    - ATTRIB statement 105
    - DATA step 103
    - FORMAT statement 104
    - IN= data set option 105
    - INFORMAT statement 104
    - INPUT statement 103
    - LENGTH statement 104
  - variables, dropping
    - example 111
    - order of applications 111
    - with input/output data sets 110
    - with statements or data set options 110
  - variables, floating point precision 112
    - computations on fractions 116
    - determining minimum storage length 119
    - double-precision versus single precision 120
    - IBM mainframes 113
    - IEEE standard 115
    - numeric comparisons 117
    - OpenVMS 115
    - transferring between operating systems 120
    - truncating during comparisons 119
    - truncating on storage 117
    - versus magnitude 116
  - variables, keeping
    - example 111
    - order of applications 111
    - with input/output data sets 110
  - with statements or data set options 110
  - variables, renaming
    - example 111
    - order of applications 111
    - with input/output data sets 110
    - with statements or data set options 110
  - version compatibility 494
    - MDDDB files 502
    - SAS catalogs 501
    - SAS data files 498
    - SAS data libraries 497
    - SAS library engines 495
    - SAS views 500
    - stored compiled DATA step programs 502
  - view descriptors 461
  - VNFERR system option 195
  - VOPTION dictionary table 88
- ## W
- Web tool functions 51
  - WHERE= data set option 269
  - WHERE expressions 146
  - WHERE statement 269
  - WHERE-expression processing 229
    - arithmetic operators 233
    - BETWEEN-AND operator 235
    - colon modifier 234
    - combining with logical operators 239
    - comparison operators 233
    - compound expressions 239
    - concatenation operator 238
    - constants 232
    - CONTAINS operator 235
    - efficiency 240
    - fully-bounded range condition 234
    - functions 232
    - I/O performance optimization 245
    - IN operator 234
    - IS MISSING operator 236
    - IS NULL operator 236
    - LIKE operator 236
    - MAX operator 238
    - MIN operator 238
    - nesting 240
    - order of operations 240
    - prefix operators 238
    - SAME-AND operator 237
    - sounds-like operator 237
  - syntax 231
  - trimming trailing spaces 235
  - variables 231
  - versus subsetting IF statements 241
  - where to use 230
  - window display statements 84
  - windowing environment 4, 7
    - customizing 9
  - words 15
    - literals 15
    - numbers 15
    - SAS name literals 21
    - spacing in statements 17
    - special characters 15
    - types of 15
    - variable names 20
  - WORK library 392
- ## Y
- Y2K problem 171
    - and data integrity 175
    - corrective strategies 176
    - example 176
    - potential problem areas 174
    - tools for 175
  - year 2000 148
  - YEARCUTOFF= system option
    - example 173
    - reading two-digit years 172
    - specifying century cutoff 148
  - years, two and four digit
    - example 173
    - reading 172
    - YEARCUTOFF= system option 148
  - youngest version 405
- ## Z
- ZIP code functions 51
  - zoned decimal data, formats 33
    - languages supporting 34
    - platforms supporting 34
    - summary table 35
  - zoned decimal data, informats 71
    - languages supporting 72
    - platforms supporting 72
    - summary table 73