- Forword to the Second Edition p. xi
- Preface p. xiii
- 1 Conventional Number Systems p. 1
- 1.1 The Binary Number System p. 1
- 1.2 Machine Representations of Numbers p. 2
- 1.3 Radix Conversions p. 4
- 1.4 Representations of Negative Numbers p. 6
- 1.5 Addition and Subtraction p. 13
- 1.6 Arithmetic Shift Operations p. 15
- 1.7 Exercises p. 16
- 1.8 References p. 17
- 2 Unconventional Fixed-Radix Number Systems p. 19
- 2.1 Negative-Radix Number Systems p. 19
- 2.2 A General Class of Fixed-Radix Number Systems p. 21
- 2.3 Signed-Digit Number Systems p. 23
- 2.4 Binary SD Numbers p. 27
- 2.5 Exercises p. 32
- 2.6 References p. 33
- 3 Sequential Algorithms for Multiplication and Division p. 35
- 3.1 Sequential Multiplication p. 35
- 3.2 Sequential Division p. 39
- 3.3 Nonrestoring Division p. 42
- 3.4 Square Root Extraction p. 48
- 3.5 Exercises p. 50
- 3.6 References p. 52
- 4 Binary Floating-Point Numbers p. 53
- 4.1 Preliminaries p. 53
- 4.2 Floating-Point Operations p. 59
- 4.3 Choice of Floating-Point Representation p. 65
- 4.4 The IEEE Floating-Point Standard p. 67
- 4.5 Round-off Schemes p. 71
- 4.6 Guard Digits p. 76
- 4.7 Floating-Point Adders p. 81
- 4.8 Exceptions p. 84
- 4.9 Round-off Errors and Their Accumulation p. 87
- 4.10 Exercises p. 89
- 4.11 References p. 91
- 5 Fast Addition p. 93
- 5.1 Ripple-Carry Adders p. 93
- 5.2 Carry-Look-Ahead Adders p. 95
- 5.3 Conditional Sum Adders p. 99
- 5.4 Optimality of Algorithms and Their Implementations p. 102
- 5.5 Carry-Look-Ahead Addition Revisited p. 106
- 5.6 Prefix Adders p. 109
- 5.7 Ling Adders p. 110
- 5.8 Carry-Select Adders p. 113

- 5.9 Carry-Skip Adders p. 116
- 5.10 Hybrid Adders p. 119
- 5.11 Carry-Save Adders p. 124
- 5.12 Pipelining of Arithmetic Operations p. 132
- 5.13 Exercises p. 135
- 5.14 References p. 138
- 6 High-Speed Multiplication p. 141
- 6.1 Reducing the Number of Partial Products p. 141
- 6.2 Implementing Large Multipliers Using Smaller Ones p. 149
- 6.3 Accumulating the Partial Products p. 145
- 6.4 Alternative Techniques for Partial Product Accumulation p. 157
- 6.5 Fused Multiply-Add Unit p. 165
- 6.6 Array Multipliers p. 167
- 6.7 Optimality of Multiplier Implementations p. 174
- 6.8 Exercises p. 176
- 6.9 References p. 179
- 7 Fast Division p. 181
- 7.1 SRT Division p. 181
- 7.2 High-Radix Division p. 187
- 7.3 Speeding Up the Division Process p. 198
- 7.4 Array Dividers p. 203
- 7.5 Fast Square Root Extraction p. 206
- 7.6 Exercises p. 209
- 7.7 References p. 210
- 8 Division Through Multiplication p. 213
- 8.1 Division by Convergence p. 213
- 8.2 Division by Reciprocation p. 218
- 8.3 Exercises p. 222
- 8.4 References p. 223
- 9 Evaluation of Elementary Functions p. 225
- 9.1 The Exponential Function p. 226
- 9.2 The Logarithm Function p. 229
- 9.3 The Trigonometric Functions p. 232
- 9.4 The Inverse Trigonometric Functions p. 235
- 9.5 The Hyperbolic Functions p. 238
- 9.6 Bounds on the Approximation Error p. 239
- 9.7 Speed-up Techniques p. 241
- 9.8 Other Techniques for Evaluating Elementary Functions p. 243
- 9.9 Exercises p. 244
- 9.10 References p. 245
- 10 Logarithmic Number Systems p. 247
- 10.1 Sign-Logarithm Number Systems p. 247
- 10.2 Arithmetic Operations p. 249
- 10.3 Comparison to Binary Floating-Point Numbers p. 252
- 10.4 Conversions to/from Conventional Representations p. 253
- 10.5 Exercises p. 255

- 10.6 References p. 256
- 11 The Residue Number System p. 259
- 11.1 Preliminaries p. 259
- 11.2 Arithmetic Operations p. 261
- 11.3 The Associated Mixed-Radix System p. 264
- 11.4 Conversion of Numbers from/to the Residue System p. 266
- 11.5 Selecting the Moduli p. 267
- 11.6 Error Detection and Correction p. 269
- 11.7 Exercises p. 274
- 11.8 References p. 275
- Index p. 277