

CONTENTS

Chapter 3—Random Numbers	1
3.1. Introduction	1
3.2. Generating Uniform Random Numbers	9
3.2.1. The Linear Congruential Method	9
3.2.1.1. Choice of modulus	11
3.2.1.2. Choice of multiplier	15
3.2.1.3. Potency	22
3.2.2. Other Methods	25
3.3. Statistical Tests	38
3.3.1. General Test Procedures for Studying Random Data	38
3.3.2. Empirical Tests	59
*3.3.3. Theoretical Tests	75
3.3.4. The Spectral Test	89
3.4. Other Types of Random Quantities	114
3.4.1. Numerical Distributions	114
3.4.2. Random Sampling and Shuffling	136
*3.5. What is a Random Sequence?	142
3.6. Summary	170
 Chapter 4—Arithmetic	 178
4.1. Positional Number Systems	179
4.2. Floating-Point Arithmetic	198
4.2.1. Single-Precision Calculations	198
4.2.2. Accuracy of Floating-Point Arithmetic	213
*4.2.3. Double-Precision Calculations	230
4.2.4. Distribution of Floating-Point Numbers	238
4.3. Multiple-Precision Arithmetic	250
4.3.1. The Classical Algorithms	250
*4.3.2. Modular Arithmetic	268
*4.3.3. How Fast Can We Multiply?	278
4.4. Radix Conversion	300
4.5. Rational Arithmetic	313
4.5.1. Fractions	313
4.5.2. The Greatest Common Divisor	316
*4.5.3. Analysis of Euclid's Algorithm	339
4.5.4. Factoring into Primes	364

4.6. Polynomial Arithmetic	399
4.6.1. Division of Polynomials	401
*4.6.2. Factorization of Polynomials	420
4.6.3. Evaluation of Powers	441
4.6.4. Evaluation of Polynomials	466
*4.7. Manipulation of Power Series	506
Answers to Exercises	516
Appendix A—Tables of Numerical Quantities	659
1. Fundamental Constants (decimal)	659
2. Fundamental Constants (octal)	660
3. Harmonic Numbers, Bernoulli Numbers, Fibonacci Numbers	661
Appendix B—Index to Notations	663
Index and Glossary	668