Contents

Preface to a Preliminary Edition **ix**
Introduction **xi**

0 Review of Arithmetic **1**
0.1 Counting Numbers 1
0.2 Integers 13
0.3 Inequalities 18
0.4 Extras 23

1 Divisibility **27**
1.1 Basic Properties of Divisibility 27
1.2 The Arithmetic of Divisibility 31
1.3 Divisibility Problems 34
1.4 Extras 38

2 Congruence **45**
2.1 The Division Algorithm 46
2.2 Basic Properties and Arithmetic of Congruence 50
2.3 Congruence and Divisibility 54
2.4 Extras 59

3 Common Divisors and Multiples **65**
3.1 Greatest Common Divisors and the Euclidean Algorithm 66
3.2 Relatively Prime Numbers 73
3.3 Least Common Multiples 77
3.4 Extras 81

4 Linear Diophantine Equations **91**
4.1 Bézoutian Algorithm 91
4.2 Homogeneous and Non-homogeneous Equations 99
4.3 Linear Diophantine Problems 102
4.4 Extras 108

5 Prime Factorizations **115**
5.1 Prime and Composite Numbers 116
5.2 Fundamental Theorem of Arithmetic 119
5.3 Applications of the Fundamental Theorem of Arithmetic 124
5.4 Extras 127

6 Rational and Irrational Numbers **133**
6.1 Fractions 133
6.2 Decimals 138
6.3 Real Numbers 144
6.4 Extras 149

7 Numeration Systems **155**
7.1 Arithmetic in Other Bases 156
7.2 Conversion between Bases 163
7.3 Applications of Other Bases 167
7.4 Extras 174

Appendix: A Legacy of Martin Gardner **183**

Solution to Odd-numbered Exercises **185**

Index **221**
About the Author **225**