## Contents

Preface ..... ix
PART I. Overview and Introduction
The $3 x+1$ problem: an overview Jeffrey C. Lagarias ..... 3
The $3 x+1$ problem and its generalizations
Jeffrey C. Lagarias ..... 31
PART II. Survey Papers
A $3 x+1$ survey: Number theory and dynamical systems Marc Chamberland ..... 57
Generalized $3 x+1$ mappings: Markov chains and ergodic theory K. R. Matthews ..... 79
Generalized $3 x+1$ functions and the theory of computation Pascal Michel and Maurice Margenstern ..... 105
PART III: Stochastic Modelling and Computation Papers
Stochastic models for the $3 x+1$ and $5 x+1$ problems and related problems Alex V. Kontorovich and Jeffrey C. Lagarias ..... 131
Empirical verification of the $3 x+1$ and related conjectures Tomás Oliveira e Silva ..... 189
PART IV. Reprinted Early Papers
Cyclic sequences and frieze patterns (The Fourth Felix Behrend MemorialLecture)
H. S. M. Coxeter ..... 211
Unpredictable iterations
J. H. Conway ..... 219
Iteration of the number-theoretic function: $f(2 n)=n, f(2 n+1)=3 n+2$ C. J. Everett ..... 225
Don't try to solve these problems! Richard K. Guy ..... 231
On the motivation and origin of the $(3 n+1)$-problem Lothar Collatz ..... 241
FRACTRAN: A simple universal programming language for arithmetic J. H. Conway ..... 249
PART V: Annotated Bibliography
The $3 x+1$ problem: An annotated bibliography (1963-1999)
Jeffrey C. Lagarias ..... 267

