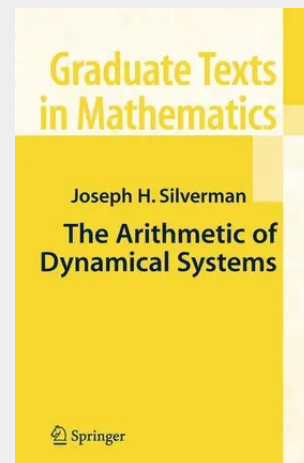


The Arithmetic of Dynamical Systems

This book investigates the relatively new subject of Arithmetic Dynamics, which is the study of the number theoretic properties of algebraic numbers or points under repeated application of a polynomial or rational map. Classical discrete dynamics is the study of iteration of functions mapping the complex plane (or real line) to itself. Arithmetic dynamics is the study of the number-theoretic properties of rational and algebraic points under repeated application of a polynomial or rational function. The viewpoint of this book is that many of the fundamental problems in the theory of Diophantine equations have dynamical analogs. As is typical in any subject combining Diophantine problems and geometry, an overarching theme is that at least qualitatively, the geometry determines the arithmetic.

This book is designed to provide a path for the reader into an amalgamation of two venerable areas of mathematics, Dynamical Systems and Number Theory. Many of the motivating theorems and conjectures in the new subject of Arithmetic Dynamics may be viewed as the transposition of classical results in the theory of Diophantine equations to the setting of discrete dynamical systems, especially to the iteration theory of maps on the projective line and other algebraic varieties. Although there is no precise dictionary connecting the two areas, the reader will gain a flavor of the correspondence from the following associations: Diophantine Equations Dynamical Systems rational and integral rational and integral points on varieties points in orbits torsion points on periodic and preperiodic abelian varieties points of rational maps There are a variety of topics covered in this volume, but inevitably the choice reflects the author's tastes and interests. Many related areas that also fall under the heading of arithmetic or algebraic dynamics have been omitted in order to keep the book to a manageable length. A brief list of some of these omitted topics may be found in the introduction. Online Resources The reader will find additional material, references and errata at <http://www.math.brown.edu/~jhs/ADSHome.html> Acknowledgments The author has consulted a great many sources in writing this book. Every attempt has been made to give proper attribution for all but the most standard results.



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