

TABLE OF CONTENTS

	Page
CHAPTER I. BASIC DEFINITIONS AND PROPERTIES	1
1. Introduction	1
2. Semidynamical Systems: Definitions and Conventions	2
3. A Glimpse of Things to Come; An Example from a Function Space	5
4. Solutions	7
5. Critical and Periodic Points	10
6. Classification of Positive Orbits	16
7. Discrete Semidynamical Systems	24
8. Local Semidynamical Systems; Reparametrization	25
9. Exercises	31
10. Notes and Comments	33
CHAPTER II. INVARIANCE, LIMIT SETS, AND STABILITY	35
1. Introduction	35
2. Invariance	36
3. Limit Sets: The Generalized Invariance Principle	39
4. Minimality	45
5. Prolongations and Stability of Compact Sets	52
6. Attraction: Asymptotic Stability of Compact Sets	56
7. Continuity of the Hull and Limit Set Maps in Metric Spaces	62
8. Lyapunov Functions: The Invariance Principle	77
9. From Stability to Chaos: A Simple Example	80
10. Exercises	92
11. Notes and Comments	95
CHAPTER III. MOTIONS IN METRIC SPACE	98
1. Introduction	98
2. Lyapunov Stable Motions	99
3. Recurrent Motions	105
4. Almost Periodic Motions	111
5. Asymptotically Stable Motions	121
6. Periodic Solutions of an Ordinary Differential Equation	125
7. Exercises	131
8. Notes and Comments	133
CHAPTER IV. NONAUTONOMOUS ORDINARY DIFFERENTIAL EQUATIONS	137
1. Introduction	137
2. Construction of the Skew Product Semidynamical System	140
3. Compactness of the Space \mathcal{F}	151
4. The Invariance Principle for Ordinary Differential Equations	155
5. Limiting Equations and Stability	173

	Page
CHAPTER IV (cont.)	
6. Differential Equations without Uniqueness	189
7. Volterra Integral Equations	192
8. Exercises	202
9. Notes and Comments	205
CHAPTER V. SEMIDYNAMICAL SYSTEMS IN BANACH SPACE	209
1. Introduction	209
2. Nonlinear Semigroups and Their Generators	212
3. The Generalized Domain for Accretive Operators	225
4. Precompactness of Positive Orbits	231
5. Solution of the Cauchy Problem	244
6. Structure of Positive Limit Sets for Contraction Semigroups	253
7. Exercises	270
8. Appendix: Proofs of Theorems 2.4 and 2.16	273
9. Notes and Comments	279
CHAPTER VI. FUNCTIONAL DIFFERENTIAL EQUATIONS	283
1. Why Hereditary Dependence, Some Examples from Biology, Mechanics, and Electronics	283
2. Definitions and Notation: Functional Differential Equations with Finite or Infinite Delay. The Initial Function Space	285
3. Existence of Solutions of Retarded Functional Equations	292
4. Some Remarks on the Semidynamical System Defined by the Solution to an Autonomous Retarded Functional Differential Equation: The Invariance Principle and Stability	303
5. Some Examples of Stability of RFDE's	312
6. Remarks on the Asymptotic Behavior of Nonautonomous Retarded Functional Differential Equations	326
7. Critical Points and Periodic Solutions of Autonomous Retarded Functional Differential Equations	330
8. Neutral Functional Differential Equations	337
9. A Flip-Flop Circuit Characterized by a NFDE - The Stability of Solutions	351
10. Exercises	360
11. Notes and Comments	365
CHAPTER VII. STOCHASTIC DYNAMICAL SYSTEMS	369
1. Introduction	369
2. The Space of Probability Measures	370
3. Markov Transition Operators and the Semidynamical System	371
4. Properties of Positive Limit Sets	374
5. Critical Points for Markov Processes	378
6. Stochastic Differential Equations	380
7. The Invariance Principle for Markov Processes	384
8. Exercises	389
9. Notes and Comments	392

Table of Contents

	Page
CHAPTER VIII. WEAK SEMIDYNAMICAL SYSTEMS AND PROCESSES	393
1. Introduction	393
2. Weak Semidynamical Systems	395
3. Compact Processes	400
4. Uniform Processes	410
5. Solutions of Nonautonomous Ordinary Differential Equations Revisited - A Compact Process	411
6. Solutions of a Wave Equation - A Uniform Process	412
7. Exercises	422
8. Notes and Comments	423
APPENDIX A	424
0. Preliminaries	424
1. Commonly Used Symbols	424
2. Nets	425
3. Uniform Topologies	427
4. Compactness	428
5. Linear Spaces	429
6. Duality	431
7. Hilbert Spaces	432
8. Vector Valued Integration	433
9. Sobolev Spaces	435
10. Convexity	436
11. Fixed Point Theorems	437
12. Almost Periodicity	438
13. Differential Inequalities	438
APPENDIX B	440
1. Probability Spaces and Random Variables	440
2. Expectation	441
3. Convergence of Random Variables	443
4. Stochastic Processes; Martingales and Markov Processes	443
5. The Ito Stochastic Integral	446
REFERENCES	447
INDEX OF TERMS	465
INDEX OF SYMBOLS	473