

Contents

	<i>Preface</i>	<i>page</i> vii
1	Mathematical toolbox	1
	1.1 Difference equations	1
	1.2 Differential equations – an introduction	5
	1.3 Some equations admitting closed form solutions	7
	1.4 The Cauchy problem – existence and uniqueness	11
2	Basic difference equations models and their analysis	18
	2.1 Difference equations of financial mathematics	19
	2.2 Difference equations of population theory	23
	2.3 Some applications of discrete population models	31
	2.4 Some explicitly solvable nonlinear models	34
3	Basic differential equations models	37
	3.1 Equations related to financial mathematics	38
	3.2 Radiocarbon dating	41
	3.3 Differential equations for population models	42
	3.4 Equations of motion: second-order equations	50
	3.5 Equations arising from geometrical modelling	58
4	Qualitative theory for a single equation	66
	4.1 Equilibria of first-order equations	66
	4.2 Equilibrium points of difference equations	75

5	From discrete to continuous models and back	92
5.1	Discretizing differential equations	92
5.2	Discrete equations in continuous time models	98
5.3	Stability of differential and difference equations	105
	<i>References</i>	109
	<i>Index</i>	110