Contents

a Proof of Global Stability with Gross Substitutability --- The result - a

b. The Classical Theory of Optimization

man modity Case

PREFACE TO SECOND EDITION	iii
PREFACE TO FIRST EDITION	
INTRODUCTION	
A. Scope of the Book B. Outline of the Book	XV
SOME FREQUENTLY USED NOTATIONS	3
CHAPTER 0 PRELIMINARIES	5
A. Mathematical Preliminaries	5
 a. Some Basic Concepts and Notations b. Rⁿ and Linear Space c. Basis and Linear Functions d. Convex Sets e. A Little Topology 	5 9 14 20 23
B. Separation Theorems C. Activity Analysis and the General Production Set	49
CHAPTER 1 DEVELOPMENTS OF NONLINEAR PROGRAMMING	59
A. Introduction B. Concave Programming—Saddle-Point Characterization C. Differentiation and the Unconstrained Maximum Problem	59 66 79
a. Differentiation b. Unconstrained Maximum D. The Quasi-Saddle-Point Characterization	79 86 90
Appendix to Section D: A Further Note on the Arrow-Hurwicz-Uzawa Theorem	106

X CONTENTS

E.	Some Extensions	112
	a. Quasi-Concave Programming	113
	b. The Vector Maximum Problem	116
	c. Quadratic Forms, Hessians, and Second-Order Conditions	121
F.	Applications, Envelope Theorem, Duality, and Related Topics	133
	a. Some Applications	133
	b. The Envelope Theorem	137
	c. Elements of Micro Theory	141
	d. Elasticities of Factor Substitution, Duality, and	133
	Translog Estimation	144
G.	Linear Programming and Classical Optimization	155
	a. Linear Programming	156
	b. The Classical Theory of Optimization	159
	c. Comparative Statics	161
	d. The Second-Order Conditions and Comparative Statics	162
	e. An Example: Hicks-Slutsky Equation	163
200.012		
CHAP	PTER 2 THE THEORY OF COMPETITIVE MARKETS	169
A.	Introduction	
В.	Consumption Set and Preference Ordering	175
	a. Consumption Set	175
	b. Ouasi-Ordering and Preference Ordering	176
	c. Utility Function	179
	d. The Convexity of Preference Ordering	181
C.	The Two Classical Propositions of Welfare Economics	185
Appel	ndix to Section C: Introduction to the Theory of the Core	204
		204
		207
	b. Some Basic Concepts c. Theorems of Debreu and Scarf	213
		218
		224
0.0		
D.	Demand Theory	234
Appel	ndix to Section D: Various Concepts of Semicontinuity and the	249
	Maximum Theorem	17-55-35
	a. Various Concepts of Semicontinuity	249
	b. The Maximum Theorem	253
E.	The Existence of Competitive Equilibrium	255
	a. Historical Background	255
	b. McKenzie's Proof	265
1000		
Appel	ndix to Section E: On the Uniqueness of Competitive Equilibrium	280

F.	Programming, Pareto Optimum, and the Existence of Competitive Equilibria	,D 5	285
419	de Optimal Sunctions of Valletions of Valletions of Translate Lamitage		295
CHAP	Costimal Program for an Infinite Horizon Problem Boilbubovini		194
A.	Introduction		295
B.	Elements of the Theory of Differential Equations		302
C.	The Stability of Competitive Equilibrium—The Historical Background		313
0	A Proof of Global Stability for the Three-Commodity Case (with		313
D.	Gross Substitutability)—An Illustration of the Phase Diagram		
	Technique		321
E.	A Proof of Global Stability with Gross Substitutability—The		
	n-commodity Case		325
F.	Some Remarks		331
	a. An Example of Gross Substitutability	4	331
	b. Scarf's Counterexample		333
	c. Consistency of Various Assumptions		335
	d. Nonnegative Prices		336
G.	The Tâtonnement and the Non-Tâtonnement Processes		339
	a. The Behavioral Background and the Tâtonnement Process		340
	b. The Tâtonnement and the Non-Tâtonnement Processes		341
Н.	Liapunov's Second Method		347
	Use of the Control Parameter noitoubould!		567
CHAP	TER 4 FROBENIUS THEOREMS, DOMINANT DIAGONAL		
	MATRICES, AND APPLICATIONS		359
A.	Introduction		359
B.	Frobenius Theorems		367
C.	Dominant Diagonal Matrices		380
D.	Some Applications		391
	a. Summary of Results		391
	b. Input-Output Analysis		394
	c. The Expenditure Lag Input-Output Analysis		396
	d. Multicountry Income Flows e. A Simple Dynamic Leontief Model		397 398
	e. A Simple Dynamic Leontief Model f. Stability of Competitive Equilibrium		399
	g. Comparative Statics		403
	amenoent edigm		
CHAP	TER 5 THE CALCULUS OF VARIATIONS AND THE		
	OPTIMAL GROWTH OF AN AGGREGATE		
	ECONOMY		410
A.	Elements of the Calculus of Variations and Its Applications		410
	a. Statement of the Problem	iana *	410

	b. Euler's Equation c. Solutions of Illustrative Problems	413
B.	Spaces of Functions and the Calculus of Variations	419
	 a. Introduction b. Spaces of Functions and Optimization c. Euler's Condition and a Sufficiency Theorem 	419
C. D.	A Digression: The Neo-Classical Aggregate Growth Model The Structure of the Optimal Growth Problem for an Aggregate Economy	444
	 a. Introduction b. The Case of a Constant Capital:Output Ratio c. Nonlinear Production Function with Infinite Time Horizon 	444 450 459
Apper	ndix to Section D: A Discrete Time Model of One-Sector Optimal Growth and Sensitivity Analysis	468
	 a. Introduction b. Model c. The Optimal Attainable Paths d. Sensitivity Analysis: Brock's Theorem 	468 470 474 480
CHAP	TER 6 MULTISECTOR MODELS OF ECONOMIC GROWTH	486
A.	The von Neumann Model a. Introduction b. Major Theorems c. Two Remarks	486 491 497
B.	The Dynamic Leontief Model	503
	 a. Introduction b. The Output System c. The Price System d. Inequalities and Optimization Model (Solow) e. Morishima's Model of the Dynamic Leontief System 	503 507 517 522 527
	ndix to Section B: Some Problems in the Dynamic Leontief Model—The One-Industry Illustration	541
CHAP	PTER 7 MULTISECTOR OPTIMAL GROWTH MODELS	559
A.	Turnpike Theorems	559
	 a. Introduction b. The Basic Model and Optimality c. Free Disposability and the Condition for Optimality d. The Radner Turnpike Theorem 	559 561 563 567
В.	Multisector Optimal Growth with Consumption	575
	a. Introduction	575

to discuss the analytical and mathematical approach.