CONTENTS

PREFACE		xv
PART I ECONOMIC A	AGENTS	1
CHAPTER 1	CONSUMER THEORY	3
1.1	Primitive Notions	3
1.2	Preferences and Utility	4
1.2.1		5
1.2.2	The Utility Function	13
1.3	The Consumer's Problem	19
1.4	Indirect Utility and Expenditure	28
1.4.1	The Indirect Utility Function	28
1.4.2	The Expenditure Function	33
1.4.3	Relations Between the Two	41
1.5	Properties of Consumer Demand	48
1.5.1	Relative Prices and Real Income	48
1.5.2	Income and Substitution Effects	50
1.5.3	Some Elasticity Relations	59
1.6	Exercises	63

CHAPTER 2	TOPICS IN CONSUMER THEORY	73
2.1.1 2.1.2 2.1.3	Duality: A Closer Look Expenditure and Consumer Preferences Convexity and Monotonicity Indirect Utility and Consumer Preferences	73 73 78 81
2.2	Integrability	85
2.3	Revealed Preference	91
2.4.1 2.4.2 2.4.3	Uncertainty Preferences Von Neumann-Morgenstern Utility Risk Aversion	97 98 102 110
2.5	Exercises	118
CHAPTER 3	THEORY OF THE FIRM	125
3.1	Primitive Notions	125
3.2 3.2.1	Production Returns to Scale and Varying Proportions	126 132
3.3	Cost	135
3.4	Duality in Production	143
3.5 3.5.1 3.5.2	The Competitive Firm Profit Maximisation The Profit Function	1 45 145 147
3.6	Exercises	154
PART II MARKETS AN	ND WELFARE	163
CHAPTER 4	PARTIAL EQUILIBRIUM	165
4.1	Perfect Competition	165
4.2 4.2.1	Imperfect Competition Cournot Oligopoly	1 70



4.2.2	Bertrand Oligopoly	175
4.2.3	Monopolistic Competition	177
4.3	Equilibrium and Welfare	179
4.3.1	Price and Individual Welfare	
4.3.2	Efficiency of the Competitive Outcome	179
4.3.3	Efficiency and Total Surplus Maximisation	183 186
4.4	Exercises	
4.4	Exercises	188
CHAPTER 5	GENERAL EQUILIBRIUM	195
5.1	Equilibrium in Exchange	196
5.2	Equilibrium in Competitive Market	
	Systems	201
5.2.1	Existence of Equilibrium	203
5.2.2	Efficiency	212
5.3	Equilibrium in Production	220
5.3.1	Producers	220
5.3.2	Consumers	223
5.3.3	Equilibrium	225
5.3.4	Welfare	232
5.4	Contingent Plans	236
5.4.1	Time	236
5.4.2	Uncertainty	236
5.4.3	Walrasian Equilibrium with Contingent Commodities	
	Commodities	237
5.5	Core and Equilibria	239
5.5.1	Replica Economies	240
5.6	Exercises	251
CHAPTER 6	SOCIAL CHOICE AND WELFARE	267
6.1	The Nature of the Problem	267
6.2	Social Choice and Arrow's Theorem	269
6.2.1	A Diagrammatic Proof	274

X

6.3	Measurability, Comparability, and Some Possibilities	279
6.3.1	The Rawlsian Form	282
6.3.2	The Utilitarian Form	284
6.3.3	Flexible Forms	285
6.4	Justice	288
6.5	Social Choice and the Gibbard-Satterthwaite Theorem	290
6.6	Exercises	296
PART III STRATEGIC BE	HAVIOUR	303
CHAPTER 7	GAME THEORY	305
7.1	Strategic Decision Making	305
7.2	Strategic Form Games	307
7.2.1	Dominant Strategies	308
7.2.2	Nash Equilibrium	311
7.2.3	Incomplete Information	319
7.3	Extensive Form Games	325
7.3.1	Game Trees: A Diagrammatic Representation	328
7.3.2	An Informal Analysis of Take-Away	330
7.3.3	Extensive Form Game Strategies	331
7.3.4	Strategies and Payoffs	332
7.3.5	Games of Perfect Information and Backward	
	Induction Strategies	333
7.3.6	Games of Imperfect Information and Subgame	
727	Perfect Equilibrium	337
7.3.7	Sequential Equilibrium	347
7.4	Exercises	364
CHAPTER 8	INFORMATION ECONOMICS	379
8.1	Adverse Selection	380
8.1.1	Information and the Efficiency of Market Outcomes	380

8.1.2 8.1.3	Signalling Screening	385 404
8.2 8.2.1 8.2.2	Moral Hazard and the Principal-Agent Problem Symmetric Information Asymmetric Information	413 414 416
8.3	Information and Market Performance	420
8.4	Exercises	421
CHAPTER 9	AUCTIONS AND MECHANISM DESIGN	427
9.1	The Four Standard Auctions	427
9.2	The Independent Private Values Model	428
9.2.1	Bidding Behaviour in a First-Price, Sealed-Bid Auction	429
9.2.2 9.2.3	Bidding Behaviour in a Dutch Auction Bidding Behaviour in a Second-Price, Sealed-Bid	432
9.2.4 9.2.5	Auction Bidding Behaviour in an English Auction Revenue Comparisons	433 434 435
9.3 9.3.1	The Revenue Equivalence Theorem Incentive-Compatible Direct Selling Mechanisms:	437
9.3.2	A Characterisation Efficiency	441 444
9.4	Designing a Revenue Maximising Mechanism	444
9.4.1	The Revelation Principle	444
9.4.2	Individual Rationality	444 445
9.4.3	An Optimal Selling Mechanism	446
9.4.4 9.4.5	A Closer Look at the Optimal Selling Mechanism Efficiency, Symmetry, and Comparison to the Four Standard Auctions	451 453
9.5	Designing Allocatively Efficient	00
	Mechanisms	455
9.5.1	Quasi-Linear Utility and Private Values	456
9.5.2	Ex Post Pareto Efficiency	458

CONTENTS

9.5.3	Direct Mechanisms, Incentive Compatibility	
	and the Revelation Principle	458
9.5.4	The Vickrey-Clarke-Groves Mechanism	461
9.5.5	Achieving a Balanced Budget: Expected	
0 # 6	Externality Mechanisms	466
9.5.6	Property Rights, Outside Options, and Individual	4.60
0.5.5	Rationality Constraints	469
9.5.7	The IR-VCG Mechanism: Sufficiency of	470
0.50	Expected Surplus The Necessity of IR-VCG Expected Surplus	472
9.5.8	The Necessity of IR-VCO Expected Surplus	478
9.6	Exercises	484
MATHEMATICA	AL APPENDICES	493
CHAPTER A1	SETS AND MAPPINGS	495
A1.	l Elements of Logic	495
A1.1.		495
A1.1.		496
A1.2	2 Elements of Set Theory	497
A1.2.	The state of the s	497
A1.2.	2 Convex Sets	499
A1.2.	3 Relations and Functions	503
A1.	3 A Little Topology	505
A1.3.	•	515
A1.3.	2 Some Existence Theorems	521
A1.4	4 Real-Valued Functions	529
A1.4.		530
A1.4.	- Control of Control o	533
A1.4.		538
A1.4.		542
A1.	5 Exercises	546
CHAPTER A2	CALCULUS AND OPTIMISATION	551
A2.	1 Calculus	551

A2.1.1	Functions of a Single Variable	551
A2.1.2	Functions of Several Variables	553
A2.1.3	Homogeneous Functions	561
A2.2	Optimisation	566
A2.2.1	Real-Valued Functions of Several Variables	567
A2.2.2	Second-Order Conditions	570
A2.3	Constrained Optimisation	577
A2.3.1	Equality Constraints	577
A2.3.2	Lagrange's Method	579
A2.3.3	Geometric Interpretation	584
A2.3.4	Second-Order Conditions	588
A2.3.5	Inequality Constraints	591
A2.3.6	Kuhn-Tucker Conditions	595
A2.4	Optimality Theorems	601
A2.5	Separation Theorems	607
A2.6	Exercises	611
LIST OF THEORE	MS	619
LIST OF DEFINIT	LIST OF DEFINITIONS	
HINTS AND AN	SWERS	631
REFERENCES		641
INDEX		645