

CONTENTS

| | |
|------------------------|---|
| PREFACE | xv |
| PART I | |
| ECONOMIC AGENTS | 1 |
| CHAPTER 1 | CONSUMER THEORY |
| 1.1 | Primitive Notions |
| 1.2 | Preferences and Utility |
| 1.2.1 | Preference Relations |
| 1.2.2 | The Utility Function |
| 1.3 | The Consumer's Problem |
| 1.4 | Indirect Utility and Expenditure |
| 1.4.1 | The Indirect Utility Function |
| 1.4.2 | The Expenditure Function |
| 1.4.3 | Relations Between the Two |
| 1.5 | Properties of Consumer Demand |
| 1.5.1 | Relative Prices and Real Income |
| 1.5.2 | Income and Substitution Effects |
| 1.5.3 | Some Elasticity Relations |
| 1.6 | Exercises |

| | | |
|----------------------------|---|------------|
| CHAPTER 2 | TOPICS IN CONSUMER THEORY | 73 |
| | 2.1 Duality: A Closer Look | 73 |
| | 2.1.1 Expenditure and Consumer Preferences | 73 |
| | 2.1.2 Convexity and Monotonicity | 78 |
| | 2.1.3 Indirect Utility and Consumer Preferences | 81 |
| | 2.2 Integrability | 85 |
| | 2.3 Revealed Preference | 91 |
| | 2.4 Uncertainty | 97 |
| | 2.4.1 Preferences | 98 |
| | 2.4.2 Von Neumann-Morgenstern Utility | 102 |
| | 2.4.3 Risk Aversion | 110 |
| | 2.5 Exercises | 118 |
| CHAPTER 3 | THEORY OF THE FIRM | 125 |
| | 3.1 Primitive Notions | 125 |
| | 3.2 Production | 126 |
| | 3.2.1 Returns to Scale and Varying Proportions | 132 |
| | 3.3 Cost | 135 |
| | 3.4 Duality in Production | 143 |
| | 3.5 The Competitive Firm | 145 |
| | 3.5.1 Profit Maximisation | 145 |
| | 3.5.2 The Profit Function | 147 |
| | 3.6 Exercises | 154 |
| PART II | | |
| MARKETS AND WELFARE | | 163 |
| CHAPTER 4 | PARTIAL EQUILIBRIUM | 165 |
| | 4.1 Perfect Competition | 165 |
| | 4.2 Imperfect Competition | 170 |
| | 4.2.1 Cournot Oligopoly | 174 |

| | | |
|------------------|---|------------|
| 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 | 179 |
| 4.3.2 | Efficiency of the Competitive Outcome | 183 |
| 4.3.3 | Efficiency and Total Surplus Maximisation | 186 |
| 4.4 | Exercises | 188 |
| | | |
| CHAPTER 5 | GENERAL EQUILIBRIUM | 195 |
| <hr/> | | |
| 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 | 237 |
| 5.5 | Core and Equilibria | 239 |
| 5.5.1 | Replica Economies | 240 |
| 5.6 | Exercises | 251 |
| | | |
| CHAPTER 6 | SOCIAL CHOICE AND WELFARE | 267 |
| <hr/> | | |
| 6.1 | The Nature of the Problem | 267 |
| 6.2 | Social Choice and Arrow's Theorem | 269 |
| 6.2.1 | A Diagrammatic Proof | 274 |

| | | |
|------------------------------|--|------------|
| 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 BEHAVIOUR | | 303 |
| CHAPTER 7 | | 305 |
| 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 Perfect Equilibrium | 337 |
| 7.3.7 | Sequential Equilibrium | 347 |
| 7.4 | Exercises | 364 |
| CHAPTER 8 | | 379 |
| INFORMATION ECONOMICS | | 379 |
| 8.1 | Adverse Selection | 380 |
| 8.1.1 | Information and the Efficiency of Market Outcomes | 380 |

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

| | | |
|---|--|------------|
| 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 Externality Mechanisms | 466 |
| 9.5.6 | Property Rights, Outside Options, and Individual Rationality Constraints | 469 |
| 9.5.7 | The IR-VCG Mechanism: Sufficiency of Expected Surplus | 472 |
| 9.5.8 | The Necessity of IR-VCG Expected Surplus | 478 |
| 9.6 | Exercises | 484 |
| MATHEMATICAL APPENDICES | | 493 |
| CHAPTER A1 SETS AND MAPPINGS | | 495 |
| A1.1 | Elements of Logic | 495 |
| A1.1.1 | Necessity and Sufficiency | 495 |
| A1.1.2 | Theorems and Proofs | 496 |
| A1.2 | Elements of Set Theory | 497 |
| A1.2.1 | Notation and Basic Concepts | 497 |
| A1.2.2 | Convex Sets | 499 |
| A1.2.3 | Relations and Functions | 503 |
| A1.3 | A Little Topology | 505 |
| A1.3.1 | Continuity | 515 |
| A1.3.2 | Some Existence Theorems | 521 |
| A1.4 | Real-Valued Functions | 529 |
| A1.4.1 | Related Sets | 530 |
| A1.4.2 | Concave Functions | 533 |
| A1.4.3 | Quasiconcave Functions | 538 |
| A1.4.4 | Convex and Quasiconvex Functions | 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 THEOREMS | | 619 |
| LIST OF DEFINITIONS | | 625 |
| HINTS AND ANSWERS | | 631 |
| REFERENCES | | 641 |
| INDEX | | 645 |