Contents

numbers

1. Functions of one variable. Complex numbers

2. Limits. Differentiation (one variable)

Cauchy-Schwarz, Chebychev, Minkowski, and Jensen.

| 3. | Partial derivatives |
|----|--|
| | Partial derivatives. Chain rules. Differentials. Slopes of level curves. Implicit function theorem. Homogeneous and homothetic functions. Gradients and direc- tional derivatives. |
| 4. | Elasticities. Elasticities of substitution |
| | General and special rules. Directional elasticities. Marginal rate of substitution. Elasticity of substitution for functions of two and n variables. Allen-Uzawa's elasticity of substitution. Morishima's elasticity of substitution. |
| 5. | Systems of equations |
| | General systems of equations. Jacobians. General implicit function theorem. Degrees of freedom. The counting rule. Functional dependence. Local and global inverse function theorems. Gale-Nikaido theorems. Contraction mapping theorem. Brouwer and Kakutani's fixed point theorems. General results on linear systems of equations. |
| 6 | Inequalities 27 |
| | Inequalities for arithmetic, geometric, and harmonic means. Inequalities of Hölder, |

Roots of quadratic and cubic equations. Polynomials. Descartes's rule of signs. Classification of conics. Asymptotes. Newton's approximation method. Powers, exponentials, and logarithms. Trigonometric and hyperbolic functions. Complex

Limits. Continuity. The intermediate value theorem. Differentiable functions. General and special rules. Mean value theorems. L'Hôpital's rule. Differentials.

Integration 35
 General and special rules. Convergence of integrals. Comparison test. Leibniz's formula. The Gamma function. Stirling's formula. The Beta function. Trapezoid formula. Simpson's formula. Multiple integrals.

Difference equations. (Recurrence relations.)
 Solutions of linear equations of first, second, and higher order. Stability. Schur's theorem. Matrix formulations.

10. Differential equations 47 Separable, projective, and logistic equations. Linear first-order equations. Bernoulli and Riccati equations. General linear equations. Variation of parameters. Stability for linear equations. Routh-Hurwitz's criterion. Autonomous systems. Local and global stability. Liapmore theerems. Local-Switzer models. Local saddle point theorem. Local and global existence theorems. Partial differential equations of the first order.

14. Linear and nonlinear programming. Duality. Shadow prices. Complementary slackness. Kuhn-Tucker theorems. Saddle point results. Quasi-concave programming. Properties of value functions. Nonmeartify conditions.

| Mangasarian and Arrow's sufficiency conditions. Properties of the value function. Free terminal time problems. Scrap value functions. Current value formulations. Linear quadratic problems. Infinite horizon problems. | |
|---|--|
| Discrete dynamic optimization | |

Special matrices. Leontief systems 109
 Properties of idempotent, orthogonal, and permutation matrices. Nonnegative matrices. Frobenius roots. Decomposable matrices. Leontief systems. Hawkins-Simon conditions. Dominant diagonal matrices.

24. Comparative statics. Value functions 119
Equilibrium conditions. Comparative statics. The value function. Envelope results.

| | equation. Special functional forms and their properties. Cobb-Douglas, CES, Law of the minimum, Translog cost functions. |
|-----|--|
| 26. | Consumer theory |
| | Utility maximization. Indirect utility functions. Consumer demand functions. Roy's identity. Expenditure functions. Hicksian demand functions. Slutsky equation. Equivalent and compensating variations. Special functional forms and their properties. AIDS, LES, and Translog indirect utility function. |
| 27. | Topics from finance and growth theory |
| | Compound interest. Effective rate of interest. Present value calculations. Internal rate of return. Norstrøm's rule. Solow's growth model. Ramsey-type problem. |
| 28. | Risk and risk aversion theory |
| | Absolute and relative risk aversion. Arrow-Pratt risk premium. Stochastic dominance of first and second degree. Hadar and Russell's theorem. Rothschild-Stiglitz's theorem. |
| 29. | Finance and stochastic calculus |
| | Capital asset pricing model. Black and Schole's option pricing model. European call option. Stochastic integrals. Ito's formulas. A stochastic control problem. Hamilton-Jacobi-Bellman's equation. |
| 30. | Non-cooperative game theory |
| | An n -person game. Nash equilibrium. Mixed strategy extension of a game. Two-person games. Minimax theorem. Exchangeability property. |
| 31. | Statistical concepts |
| | Probability. Bayes rule. Expectation. Variance. Covariance. Correlation coefficient. Chebychev's inequality. Estimators. Bias. Marginal and conditional densities. Testing. Power of a test. Type I and type II errors. α -level of significance. |
| 32. | Statistical distributions. Least squares |
| | Binomial, multinomial and hypergeometric distributions. Poisson, normal, exponential, uniform, geometric, Gamma, Beta, Chi-square, Student, and F-distributions. Method of least squares. Multiple regression. |
| | Bibliography |
| | Index |
| | |

25. Properties of cost and profit functions 123

Cost functions. Conditional factor demand functions. Shephard's lemma. Profit functions. Factor demand functions. Supply functions. Hotelling's lemma. Pun's