

**ECON 603: Advanced Mathematical Analysis for Economists**

Department of Economics State University of New York at Binghamton  
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## **2. Real Analysis**

- 2.1 Sets
- 2.2 Relations
- 2.3 Functions
- 2.4 Metric spaces
- 2.5 Sequences and Convergences
- 2.6 Compactness
- 2.7 Cauchy Sequences
- 2.8 Continuity
- 2.9
- 2.10 Limits of Functions

## **3. Multivariate Calculus**

- 3.1 Derivatives
- 3.2 Gradients and Directional Derivatives
- 3.3 Homogeneity and Homotheticity
- 3.4 Mean Value Theorem and Intermediate Value Theorem
- 3.5 Convex Sets
- 3.6 Concave and Convex Functions
- 3.7 Quasiconcave and Quasiconvex Functions
- 3.8
- 3.9 Implicit Function Theorem

## **4. Integration**

- 4.1 One-Variable Integration
- 4.2
- 4.3 Multiple Integrals
- 4.4 Jacobian Determinant

## **5. Static Optimization**

- 5.1 Envelope Theorem
- 5.2 Equality Constraints: The Lagrange Problem
- 5.3 Local Second-Order Conditions
- 5.4 Inequality Constraints: The Kuhn-Tucker conditions
- 5.5 Comparative Statics Analysis

## **6. Fixed Points and Separation Theorem**

- 6.1 Contraction Mapping
- 6.2 Fixed Points Theorem (Banach / Brower / Kakutani )
- 6.3 Separation Theorem