

Math Camp for Economics

Khatam University

Summer 2017

Objective

Studying economics at the graduate level requires a considerable degree of comfort with mathematics. The purpose of this three-week course is to develop mathematical tools and intuition, which will be valuable in analyzing a wide variety of economic problems. It also covers the basics of probability theory necessary for understanding statistical inference.

Course Outline

Part I. Statistics

1. Probability Theory
 - Set Theory
 - Conditional Probability and Independence
 - Random Variables
 - Distribution Functions
2. Transformations and Expectations
 - Distributions of Functions of a Random Variable
 - Expected Values
3. Common Families of Distributions
 - Discrete Distributions
 - Continuous Distributions
4. Multiple Random Variables
 - Joint and Marginal Distributions
 - Conditional Distributions and Independence
 - Covariance and Correlation
 - Multivariate Distributions
5. Properties of a Random Sample
 - Sampling from the Normal Distribution
 - Convergence Concepts
6. Point Estimation
 - Methods of Finding Estimators
 - Methods of Evaluating Estimators
7. Hypothesis Testing
 - Methods of Finding Tests
 - Methods of Evaluating Tests
8. Interval Estimation

Part II. Mathematics

1. Linear Algebra
 - Systems of Linear Equations
 - Matrix Algebra
 - Euclidean Spaces
 - Linear Independence
2. Calculus of Several Variables
 - Limits and Open Sets
 - Functions of Several Variables
 - Calculus of Several Variables
3. Optimization
 - Quadratic Forms and Definite Matrices
 - Unconstrained Optimization
 - Constrained Optimization
 - Concave and Quasiconcave Functions

References

- Casella, G., & Berger, R. L. (2002). *Statistical Inference*. Springer.
- Simon, C., & Blume, L. (1994). *Mathematics for Economists*. W. W. Norton & Company.