MATH 310: Mathematical Statistics (brief notes)

Truong-Son Van

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## Disclaimer

This is class notes for Mathematical Statistics at Fublbright University Vietnam. I claim no originality in this work as it is mostly taken from the reference books. However, all errors and typos are solely mine.

# Probability

- 1.1 Review
- 1.2 Inequalities
- 1.3 Law of Large Numbers
- 1.4 Central Limit Theorem

# Sampling and Estimating CDF and Statistical Functionals

- 2.1 Empirical Distribution
- 2.2 Statistical Functionals
- 2.3 Bootstrap

# Parametric Inference (Parameter Estimation)

- 3.1 Method of Moments
- 3.2 Method of Maximum Likelihood
- 3.3 Bayesian Approach
- 3.4 Expectation-Maximization Algorithm
- 3.5 Unbiased Estimators
- 3.6 Efficiency: Cramer-Rao Inequality
- 3.7 Sufficiency and Unbiasedness: Rao-Blackwell Theorem

# Hypothesis Testing

- 4.1 Neyman-Pearson Lemma
- 4.2 Wald Test
- 4.3 Likelihood Ratio Test
- 4.4 Comparing samples

# Linear Least Squares

- 5.1 Simple Linear Regression
- 5.2 Matrix Approach
- 5.3 Statistical Properties