



# Mathematical Statistics with Resampling and R

By Laura M. Chihara, Tim C. Hesterberg

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**Mathematical Statistics with Resampling and R** By Laura M. Chihara, Tim C. Hesterberg

**This book bridges the latest software applications with the benefits of modern resampling techniques**

Resampling helps students understand the meaning of sampling distributions, sampling variability, P-values, hypothesis tests, and confidence intervals. This groundbreaking book shows how to apply modern resampling techniques to mathematical statistics. Extensively class-tested to ensure an accessible presentation, *Mathematical Statistics with Resampling and R* utilizes the powerful and flexible computer language R to underscore the significance and benefits of modern resampling techniques.

The book begins by introducing permutation tests and bootstrap methods, motivating classical inference methods. Striking a balance between theory, computing, and applications, the authors explore additional topics such as:

- Exploratory data analysis
- Calculation of sampling distributions
- The Central Limit Theorem
- Monte Carlo sampling
- Maximum likelihood estimation and properties of estimators
- Confidence intervals and hypothesis tests
- Regression
- Bayesian methods

Throughout the book, case studies on diverse subjects such as flight delays, birth weights of babies, and telephone company repair times illustrate the relevance of the real-world applications of the discussed material. Key definitions and theorems of important probability distributions are collected at the end of the book, and a related website is also available, featuring additional material including data sets, R scripts, and helpful teaching hints.

*Mathematical Statistics with Resampling and R* is an excellent book for courses on mathematical statistics at the upper-undergraduate and graduate levels. It also serves as a valuable reference for applied statisticians working in the areas of

business, economics, biostatistics, and public health who utilize resampling methods in their everyday work.

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## **Editorial Review**

### Review

"Mathematical Statistics with Resampling and R is a great resource for intermediate and advanced statistics students who want to achieve an indepth understanding of resampling techniques backed by practical implementation." (Book Pleasures, 2012)

"It is highly recommended to someone with a good background in mathematics, probability, and basic statistics who wants to learn about the theory and about resampling and how it relates to traditional methods, and how to implement resampling in R. The book is also a wonderful source of simulations to support the teaching of statistics." (Journal of Biopharmaceutical Statistics, 2011)

"It is less demanding mathematically, more applied in its emphasis, and more modern in content than the usual book, which makes it a good choice if you want a modern applied book at the level of Larsen and Marx (1986)."- George W. Cobb, Mount Holyoke College Department of Mathematics and Statistics (Chilean Journal of Statistics, 1 April 2011)

### From the Back Cover

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#### About the Author

**LAURA CHIHARA**, PhD, is Professor of Mathematics at Carleton College. She has extensive experience teaching mathematical statistics and applied regression analysis. She has supervised undergraduates working on statistics projects for local businesses and organizations such as Target Corporation and the Minnesota Pollution Control Agency. Dr. Chihara has experience with S+ and R from her work at Insightful Corporation (formerly MathSoft) and in statistical consulting.

**TIM HESTERBERG**, PhD, is Senior Ads Quality Statistician at Google. He was a senior research scientist for Insightful Corporation and led the development of S+Resample and other S+ and R software. Dr. Hesterberg has published numerous articles in the areas of bootstrap and related resampling techniques, Monte Carlo simulation methodology, modern regression, tectonic deformation estimation, and electric demand forecasting.

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