



Statistics Using Simulation

Why use simulation-based statistical methods?

1. We can investigate the sampling dist'n of a statistic when the data don't fit the conditions to use the "usual" sampling dist'n of the statistic.
2. We can investigate the sampling dist'n of a "new" statistic, for which we have not found a mathematical description of the sampling dist'n.
3. We can teach people to quickly and easily see the general overview of how to solve a wide range of the usual types of statistical problems.

Why not write all of your own simulations?

1. In this overall program, you will have the opportunity to write many such programs.
2. In the statistics part of this course, we intend to review / teach many techniques of a basic applied statistics course. Having a coordinated set of tools to carry out each technique quickly help us focus on the overview instead of the details.
3. Using simulation-based tools rather than the traditional formula-based methods helps you think about the issues you will encounter when you write your own simulations.

Why StatKey?

- Reasonably comprehensive
- Independent of textbook
- Always freely available
- Many datasets with multiple variables and full descriptions and references
- Help available within it and some YouTube videos made by teachers

StatKey

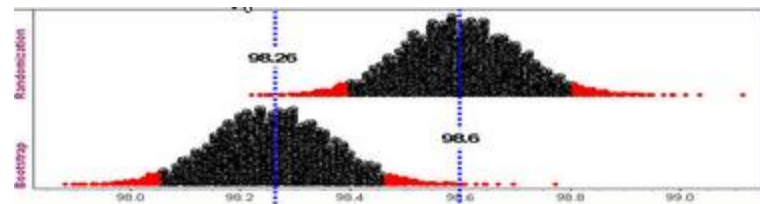
to accompany [Statistics: Unlocking the Power of Data](#)
by Lock, Lock, Lock, Lock, and Lock

Descriptive Statistics and Graphs	Bootstrap Confidence Intervals	Randomization Hypothesis Tests
One Quantitative Variable	CI for Single Mean, Median, St.Dev.	Test for Single Mean
One Categorical Variable	CI for Single Proportion	Test for Single Proportion
One Quantitative and One Categorical Variable	CI for Difference In Means	Test for Difference in Means
Two Categorical Variables	CI for Difference In Proportions	Test for Difference In Proportions
Two Quantitative Variables	CI for Slope, Correlation	Test for Slope, Correlation

Sampling Distributions	Mean	Proportion
------------------------	------	------------

Theoretical Distributions	Normal	t	χ^2	F
---------------------------	--------	---	----------	---

More Advanced Randomization Tests	χ^2 Goodness-of-Fit	χ^2 Test for Association	ANOVA for Difference in Means	ANOVA for Regression
-----------------------------------	--------------------------	-------------------------------	-------------------------------	----------------------



Statistics: Unlocking the Power of Data by Lock, Lock, Lock, Lock, and Lock

November 1, 2020

Home

Authors

Overview (pdf)

Table of Contents

Datasets

StatKey

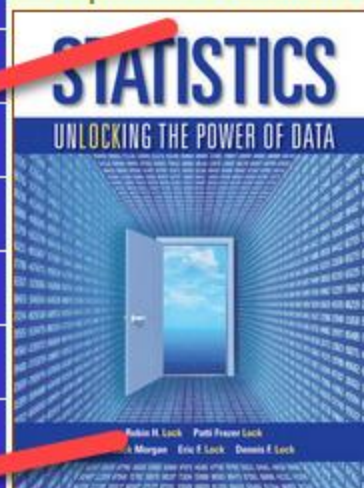
StatKey help

Videos

Presentations

Other Resources

Companion Materials for

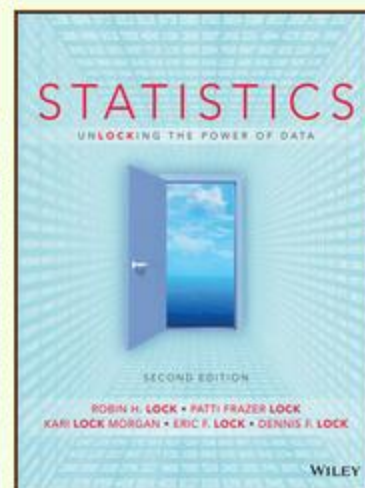


First Edition (2013)

Follow [this link](#) for more information at the Wiley site.

... or contact [Michael MacDougald](#) at Wiley.

Find an interactive unit from the text and more information about the approach at the [Wiley showcase site](#).



Second Edition (2017)

Follow [this link](#) for more information at the Wiley site

[Robin Lock](#)

St. Lawrence University

[Patti Frazer Lock](#)

St. Lawrence University

[Kari Lock Morgan](#)

Penn State University

[Eric F. Lock](#)

University of Minnesota

[Dennis F. Lock](#)

Iowa State University and Buffalo Bills



Overview



Overview of Statistics: UnLocking the Power of Data By Lock, Lock, Lock, Lock, and Lock

Sir R.A. Fisher said of simulation and permutation methods in 1936:

"Actually, the statistician does not carry out this very simple and very tedious process, but his conclusions have no justification beyond the fact that they agree with those which could have been arrived at by this elementary method."

These methods, too 'tedious' to apply in 1936, are now readily accessible. As George Cobb (2007) wrote in an article for the journal *Technology Innovations in Statistical Education*,

"... despite broad acceptance and rapid growth in enrollments, the consensus curriculum is still an unwitting prisoner of history. What we teach is largely the technical machinery of numerical approximations based on the normal distribution and its many subsidiary cogs. This machinery was

Videos



Videos

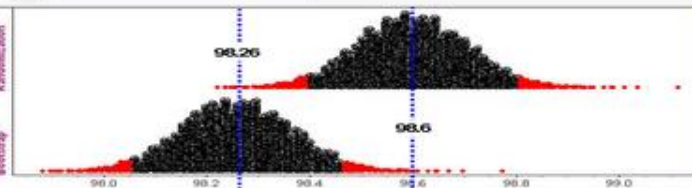
Introductory Camtasia Videos

[Watch](#) *"Overview of Randomization Tests"* (Kari - 20 minutes)

[Watch](#) *"Overview of Bootstrap Confidence Intervals"* (Patti - 20 minutes)

[Watch](#) *"Introduction to StatKey"* (Robin - 21 minutes)


<https://www.lock5stat.com/index.html>




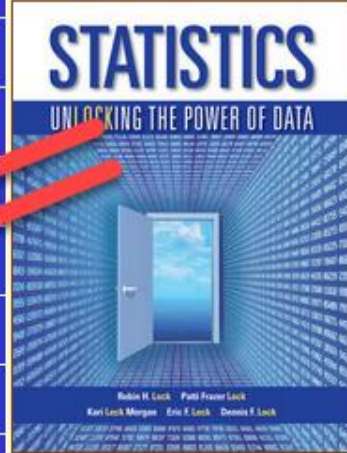
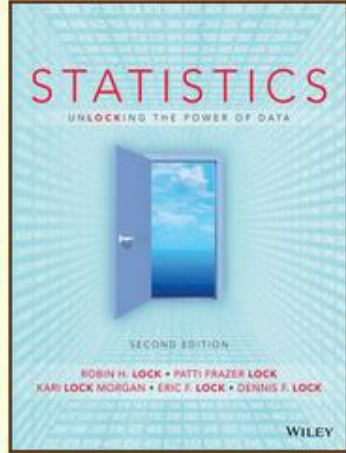
Statistics: Unlocking the Power of Data

by Lock, Lock, Lock, Lock, and Lock

November 1, 2020

- Home
- Authors
- Overview (pdf)
- Table of Contents
- Datasets
- StatKey
- StatKey help
- Videos
- Presentations
- Other Resources

Companion Materials for

First Edition (2013)
Follow [this link](#) for more information at the Wiley site.

Second Edition (2017)
Follow [this link](#) for more information at the Wiley site.

... or contact [Michael MacDougald](#) at Wiley.

Find an interactive unit from the text and more information about the approach at the [Wiley showcase site](#).


Robin Lock
St. Lawrence University

Patti Frazer Lock
St. Lawrence University

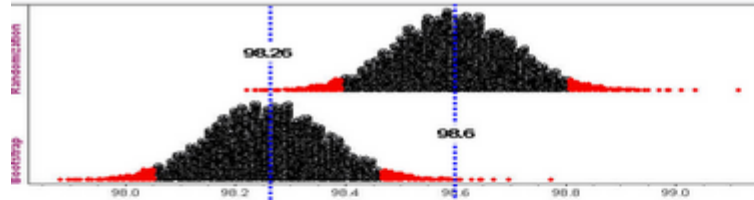
Kari Lock Morgan
Penn State University

Eric F. Lock
University of Minnesota

Dennis F. Lock
Iowa State University and Buffalo Bills



Datasets



Statistics: Unlocking the Power of Data
by Lock, Lock, Lock, Lock,

November 1, 2020

[Home](#)

[Authors](#)

[Overview \(pdf\)](#)

[Table of Contents](#)

[Datasets](#)

[StatKey](#)

Datasets - Second Edition

[Click here to get datasets for the first edition](#)

Click on a format link to download the data

Dataname	CSV	XLS	ASCII	R	Minitab	Fathom	JMP
All data files (as a zip file)	zip	zip	zip	zip	zip	zip	zip
ACS	csv	xls	txt	rda	mtw	ftm	jmp
AllCountries	csv	xlsx	txt	rda	mtw	ftm	jmp
APMultipleChoice	csv	xls	txt	rda	mtw	ftm	jmp
April14Temps	csv	xls	txt	rda	mtw	ftm	jmp
BaseballHits	csv	xlsx	txt	rda	mtw	ftm	jmp
BaseballSalaries2015	csv	xlsx	txt	rda	mtw	ftm	jmp
BaseballTimes	csv	xls	txt	rda	mtw	ftm	jmp

WaterTaste	csv	xls	txt	rda	mtw	ftm	jmp
Wetsuits	csv	xls	txt	rda	mtw	ftm	jmp
YoungBlood	csv	xlsx	txt	rda	mtw	ftm	jmp
Documentation for all datasets (as a pdf file)							