



## Essential Statistics in Business and Economics, 3rd edition

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### Overall Changes to the 3<sup>rd</sup> edition

Many changes were motivated by advice from reviewers and users of the textbook. Besides hundreds of small edits, these changes were common to most chapters:

- **New end-of-chapter Software Supplements** (MegaStat, Minitab) to allow more focus on Excel within chapters.
- **Closer exercise compatibility** with *Connect*, *SmartBook*, and *LearnSmart*.
- **Updated Related Readings and Web Sources** for students who want to “dive deeper.”
- **Revised LearningStats demonstrations** to illustrate concepts beyond what is possible in a textbook (e.g., simulations).
- **Updated test bank** (with more feedback) and updated/expanded *Big Data Sets*.
- Improved illustrations, figures, and tables.

## Chapter-by-Chapter Changes

### Chapter 1—Overview of Statistics

- New Mini Cases (e.g., analytics in business, predicting airfares, GM ignition switches).
- More discussion of using statistics in business, working in teams, and jobs for data scientists.
- Leaner discussion of critical thinking and a new exercise on critical thinking.
- Updated **Related Reading** references.

## Chapter 2—Data Collection

- Reorganized learning objectives to give more focus on testable topics.
- Improved discussion of binning in frequency distributions
- Revised treatment of variables, data types, and measurement levels.
- Reorganized presentation of samples, populations, and sampling methods,
- New Mini Cases (e.g., Super Bowl audiences).
- New, revised, and updated exercises (e.g., housing starts, lightning deaths).
- Revised explanation of data collection methods, sources of error.
- New discussion of reliability, validity, and survey software.
- Updated *Web Data Sources*, *Related Reading*, and *LearningStats* demos.

## Chapter 3—Describing Data Visually

- More efficient treatment of key topics and examples.
- Updated screenshots and advice for Excel charts, histograms, pivot tables, scatter plots.
- Moved *MegaStat* and Minitab screenshots to end-of-chapter *Software Supplement*.
- New, revised, and updated exercises (e.g., stock prices, web browsers, TV sales).
- Updated *Related Reading* references.

## Chapter 4—Descriptive Statistics

- Streamlined discussion of main concepts.
- Updated Excel screenshots for descriptive statistics.
- Moved *MegaStat* and Minitab screenshots to end-of-chapter *Software Supplement*.
- New, revised, and updated exercises (e.g., asset turnover ratios, stock prices, skewness, kurtosis, consumer expenditure, z-scores, quartiles, grouped data) and many revised data sets.
- New and updated Mini Cases (e.g., U.S. presidents' ages, car defects over time).
- Reorganized and expanded section on covariance and correlation.
- A new statistic for measuring skewness when only summarized data are available.
- New decision diagram to guide student choice of statistics and graphs.

## Chapter 5—Probability

- Revised example of defining compound events.
- Revised Mini Cases (e.g., women-owned companies, Bayes Theorem).
- New, updated, and revised exercises (e.g., free eBay shipping, YouTube videos, online sales, credit card use, flight delays).

## Chapter 6—Discrete Probability Distributions

- Reorganized learning objectives to give more focus on testable topics.
- Improved topic placement on how to recognize each type of distribution.
- Updated Excel screenshots and menus.
- New, revised, and updated exercises (e.g., music festival tickets, inner tube rentals).

## Chapter 7—Continuous Probability Distributions

- Reorganized learning objectives to give more control by testable topic.
- Revised discussion of expected value and variance.
- New, revised, and updated exercises (e.g., bus arrivals, heart rates, power surges, defect rates, expected value).
- New exercises on using Excel functions.
- Updated Excel screenshots and instructions.
- New illustration of exponential distribution families and middle areas.

### **Chapter 8—Sampling Distributions and Estimation**

- Reorganized learning objectives to give more focus on testable topics.
- Major rewrite of sections on Central Limit Theorem, sampling error, estimation, confidence intervals for proportions and standard error.
- Improved and streamlined discussion of finite population correction.
- Updated Excel screenshots and functions.
- Moved *MegaStat* and Minitab examples to end-of-chapter *Software Supplement*.
- New, revised, and updated exercises.
- Three new *LearningStats* demonstrations.

### **Chapter 9—One-Sample Hypothesis Tests**

- Reorganized sections on Type I and Type II error, decision rules, and p-values).
- Updated Excel screenshots and improved confidence interval figure.
- Revised and updated examples (e.g., using software to reduce retail fraud).
- Moved *MegaStat* and Minitab examples to end-of-chapter *Software Supplement*.
- Excel functions for tests of proportions when normality cannot be assumed.

### **Chapter 10—Two-Sample Hypothesis Tests**

- Simplified learning objectives to match content more closely.
- Updated Excel screenshots and instructions.
- Moved *MegaStat* and Minitab examples to end-of-chapter *Software Supplement*.
- More emphasis on the question of whether or not sample sizes must be equal.
- Improved notation for tests of two proportions and *F* tests.
- New graphic for Excel *F* tests and corresponding Excel functions.
- New, revised, and updated exercises (e.g., paired *t* tests).

### **Chapter 11—Analysis of Variance**

- Improved notation and graphics to illustrate one-factor ANOVA (e.g., manufacturing defect rates).
- Updated Excel screenshots and illustrations to emphasize Excel's capabilities.
- Moved *MegaStat* and Minitab examples to end-of-chapter *Software Supplement*.
- Added an alternative formula for Hartley's test.
- Improved discussion of Tukey tests.
- Optional section on Kruskal-Wallis test as alternative to ANOVA.

- Clarified instructions on exercises to improve compatibility with *Connect*.

## Chapter 12—Simple Regression

- Reorganized learning objectives to give more focus on testable topic.
- Expanded discussion on the difference between association and cause and effect.
- Updated Excel screenshots and illustrations to focus on Excel's capabilities.
- Moved *MegaStat* and Minitab examples to end-of-chapter *Software Supplement*.
- More explanation of interpreting the intercept.
- Improved residual illustrations and new graphic on heteroscedasticity patterns.
- Boxed comments on prediction interval width and unusual observations.
- New, revised, and updated exercises (e.g., outliers, leverage, SAT scores, vehicle MPG, home values).
- New section on logistic regression with a new logit data set and interpretive exercise.
- Updated *Related Reading* and one new *Learning Stats* demonstration (correlation).

## Chapter 13—Multiple Regression

- Greater emphasis on Excel, with most *MegaStat* and Minitab references moved to end-of-chapter *Software Supplement*.
- Improved distinction between confidence intervals and prediction intervals.
- Expanded discussion of multiplicative models and interaction effects.
- New graphic on heteroscedasticity patterns.
- Improved discussion of unusual observations.
- New section on logistic regression with several predictors (complementing [Chapter 12](#)).
- Expanded discussion of stepwise regression.
- Revised exercise instructions for compatibility with *Connect*<sup>®</sup>.
- Updated *Related Reading* and *LearningStats*.

## Chapter 14—Chi-Square Tests

- Reorganized learning objectives to align with concepts and *Connect*<sup>®</sup>.
- Updated screenshots, more Excel emphasis.
- New graphics for GOF tests.
- Streamlined discussion of topics (e.g., binning for normal GOF tests) and new graphics for ECDF tests.
- New, revised, and updated data sets (e.g., Kentucky Derby, national league runs, U.S. presidents' ages).
- Updated *Related Reading* references.