

# TABLE OF CONTENTS

## Licensing

## 1: Basic Ideas

- 1.1: Videos
- 1.2: Introduction
  - 1.2.1: A Classroom Story and an Inspiration
  - 1.2.2: The Blind Man and the Elephant
  - 1.2.3: What can go Wrong in Research - Two Stories
- 1.3: Displaying and Analyzing Data with Graphs
  - 1.3.1: Introduction and Examples
  - 1.3.2: Types of Data
  - 1.3.3: Levels of Data
  - 1.3.4: Graphs of Categorical Data
  - 1.3.5: Graphs of Numeric Data
    - 1.3.5.1: Stem and Leaf Plots
    - 1.3.5.2: Dot Plots
    - 1.3.5.3: Grouping Numeric Data
    - 1.3.5.4: Histograms
    - 1.3.5.5: Cumulative Frequency and Relative Frequency
    - 1.3.5.6: Using Ogives to find Percentiles
- 1.4: Introduction to Statistics
  - 1.4.1: What are Statistics?
  - 1.4.2: Importance of Statistics
  - 1.4.3: Descriptive Statistics
  - 1.4.4: Inferential Statistics
  - 1.4.5: Sampling Demonstration
  - 1.4.6: Variables
  - 1.4.7: Percentiles
  - 1.4.8: Levels of Measurement
  - 1.4.9: Measurements
  - 1.4.10: Distributions
  - 1.4.11: Summation Notation
  - 1.4.12: Linear Transformations
  - 1.4.13: Logarithms
  - 1.4.14: Statistical Literacy
  - 1.4.E: Introduction to Statistics (Exercises)
- 1.5: PowerPoints

## 2: Descriptive Statistics

- 2.1: Videos
- 2.2: Graphing Distributions
  - 2.2.1: Graphing Qualitative Variables
  - 2.2.2: Quantitative Variables
  - 2.2.3: Stem and Leaf Displays
  - 2.2.4: Histograms
  - 2.2.5: Frequency Polygons

- 2.2.6: Box Plots
- 2.2.7: Box Plot Demo
- 2.2.8: Bar Charts
- 2.2.9: Line Graphs
- 2.2.10: Dot Plots
- 2.2.11: Statistical Literacy
- 2.2.E: Graphing Distributions (Exercises)
- 2.3: PowerPoints

## 3: Regression Analysis

- 3.1: Videos
- 3.2: Bivariate Data
  - 3.2.1: Graphing Bivariate Data with Scatterplots
  - 3.2.2: Correlation Coefficient
  - 3.2.3: Correlation vs. Causation
- 3.3: Correlation and Linear Regression
  - 3.3.1: Bivariate Data and Scatterplots Review
  - 3.3.2: The Simple Linear Regression Model
  - 3.3.3: Estimating the Regression Model with the Least-Square Line
  - 3.3.4: Hypothesis Test for Simple Linear Regression
  - 3.3.5: Estimating  $\sigma$ , the standard error of the residuals
  - 3.3.6:  $r^2$ , The Correlation of Determination
  - 3.3.7: Prediction
  - 3.3.8: Extrapolation
  - 3.3.9: Residual Analysis
- 3.4: Linear Regression and Correlation
  - 3.4.1: Prelude to Linear Regression and Correlation
  - 3.4.2: Linear Equations
    - 3.4.2E: Linear Equations (Exercises)
  - 3.4.3: Scatter Plots
    - 3.4.3E: Scatter Plots (Exercises)
- 3.5: PowerPoints

## 4: Fundamental Principle of Counting and Rules of Probability

- 4.1: Videos
- 4.2: Probability Topics
  - 4.2.1: Introduction
  - 4.2.2: Terminology
  - 4.2.3: Independent and Mutually Exclusive Events
  - 4.2.4: Two Basic Rules of Probability
  - 4.2.5: Contingency Tables
  - 4.2.6: Tree and Venn Diagrams
  - 4.2.7: Probability Topics (Worksheet)
  - 4.2.E: Probability Topics (Exercises)
- 4.3: PowerPoints

## 5: Discrete Probability

- 5.1: Videos
- 5.2: Probability
  - 5.2.1: What is Probability?
  - 5.2.2: Types of Probability
  - 5.2.3: How to Calculate Classical Probability
- 5.3: PowerPoints

## 6: Binomial Probability Distribution

- 6.1: Videos
- 6.2: Mean or Expected Value and Standard Deviation
- 6.3: PowerPoints

## 7: Continuous Random Variable and Normal Probability Distribution

- 7.1: Videos
- 7.2: Continuous Random Variable - Introduction
- 7.3: The Normal Distribution
  - 7.3.1: Prelude to The Normal Distribution
  - 7.3.2: The Standard Normal Distribution
    - 7.3.2E: The Standard Normal Distribution (Exercises)
  - 7.3.3: Using the Normal Distribution
- 7.4: The Central Limit Theorem
  - 7.4.1: Prelude to the Central Limit Theorem
  - 7.4.2: The Central Limit Theorem for Sums
- 7.5: PowerPoints

## 8: Finding Confidence Interval for Population Mean and Proportion

- 8.1: Inference for Numerical Data
  - 8.1.1: One-Sample Means with the t Distribution
  - 8.1.2: Paired Data
  - 8.1.3: Difference of Two Means
  - 8.1.4: Power Calculations for a Difference of Means (Special Topic)
  - 8.1.5: Comparing many Means with ANOVA (Special Topic)
  - 8.1.6: Exercises
- 8.2: Inference for Categorical Data
  - 8.2.1: Inference for a Single Proportion
  - 8.2.2: Difference of Two Proportions
  - 8.2.3: Testing for Goodness of Fit using Chi-Square (Special Topic)
  - 8.2.4: Testing for Independence in Two-Way Tables (Special Topic)
  - 8.2.5: Small Sample Hypothesis Testing for a Proportion (Special Topic)
  - 8.2.6: Randomization Test (Special Topic)
  - 8.2.7: Exercises
- 8.3: Confidence Intervals
  - 8.3.1: Prelude to Confidence Intervals
  - 8.3.2: A Single Population Mean using the Normal Distribution
    - 8.3.2E: A Single Population Mean using the Normal Distribution (Exercises)
  - 8.3.3: A Single Population Mean using the Student t-Distribution

- 8.4: PowerPoints

## 9: Hypothesis Testing about Population Mean and Proportion

- 9.1: Inference for Numerical Data
  - 9.1.1: One-Sample Means with the t Distribution
  - 9.1.2: Paired Data
  - 9.1.3: Difference of Two Means
  - 9.1.4: Power Calculations for a Difference of Means (Special Topic)
  - 9.1.5: Comparing many Means with ANOVA (Special Topic)
  - 9.1.6: Exercises
- 9.2: Inference for Categorical Data
  - 9.2.1: Inference for a Single Proportion
  - 9.2.2: Difference of Two Proportions
  - 9.2.3: Testing for Goodness of Fit using Chi-Square (Special Topic)
  - 9.2.4: Testing for Independence in Two-Way Tables (Special Topic)
  - 9.2.5: Small Sample Hypothesis Testing for a Proportion (Special Topic)
  - 9.2.6: Randomization Test (Special Topic)
  - 9.2.7: Exercises
- 9.3: Hypothesis Testing with One Sample
  - 9.3.1: Prelude to Hypothesis Testing
  - 9.3.2: Null and Alternative Hypotheses
    - 9.3.2E: Null and Alternative Hypotheses (Exercises)
  - 9.3.3: Outcomes and the Type I and Type II Errors
    - 9.3.3E: Outcomes and the Type I and Type II Errors (Exercises)
  - 9.3.4: Distribution Needed for Hypothesis Testing
    - 9.3.4E: Distribution Needed for Hypothesis Testing (Exercises)
  - 9.3.5: Rare Events, the Sample, Decision and Conclusion
    - 9.3.5E: Rare Events, the Sample, Decision and Conclusion (Exercises)
  - 9.3.6: Additional Information and Full Hypothesis Test Examples
  - 9.3.7: Hypothesis Testing of a Single Mean and Single Proportion (Worksheet)
  - 9.3.E: Hypothesis Testing with One Sample (Exercises)
- 9.4: PowerPoints

## 10: Hypothesis Testing about Two Population Means and Proportions

- 10.1: Inference for Categorical Data
  - 10.1.1: Inference for a Single Proportion
  - 10.1.2: Difference of Two Proportions
  - 10.1.3: Testing for Goodness of Fit using Chi-Square (Special Topic)
  - 10.1.4: Testing for Independence in Two-Way Tables (Special Topic)
  - 10.1.5: Small Sample Hypothesis Testing for a Proportion (Special Topic)
  - 10.1.6: Randomization Test (Special Topic)
  - 10.1.7: Exercises
- 10.2: Hypothesis Testing with Two Samples
  - 10.2.1: Two Population Means with Unknown Standard Deviations
  - 10.2.2: Two Population Means with Known Standard Deviations
  - 10.2.3: Comparing Two Independent Population Proportions
  - 10.2.4: Matched or Paired Samples
- 10.3: PowerPoints

## 11: Hypothesis Testing about Goodness of Fit (Multinomial)

- [11.1: Inference for Categorical Data](#)
  - [11.1.1: Inference for a Single Proportion](#)
  - [11.1.2: Difference of Two Proportions](#)
  - [11.1.3: Testing for Goodness of Fit using Chi-Square \(Special Topic\)](#)
  - [11.1.4: Testing for Independence in Two-Way Tables \(Special Topic\)](#)
  - [11.1.5: Small Sample Hypothesis Testing for a Proportion \(Special Topic\)](#)
  - [11.1.6: Randomization Test \(Special Topic\)](#)
  - [11.1.7: Exercises](#)
- [11.2: The Chi-Square Distribution](#)
  - [11.2.1: Facts About the Chi-Square Distribution](#)
  - [11.2.2: Goodness-of-Fit Test](#)
  - [11.2.3: Test of Independence](#)
  - [11.2.4: Test for Homogeneity](#)
- [11.3: PowerPoints](#)

[Index](#)

[Glossary](#)

[Detailed Licensing](#)