

# TABLE OF CONTENTS

Acknowledgements

Licensing

For Faculty

## Unit 1: Description

- 1: Introduction to Behavioral Statistics
  - 1.1: Why are you taking this course?
  - 1.2: What is a statistic? What is a statistical analysis?
  - 1.3: The Scientific Method
  - 1.4: Types of Data and How to Measure Them
    - 1.4.1: IV and DV- Variables as Predictors and Outcomes
    - 1.4.2: Qualitative versus Quantitative Variables
    - 1.4.3: Scales of Measurement
  - 1.5: Populations and Samples
    - 1.5.1: Collecting Data- More Practice with Populations and Samples
  - 1.6: "Research shows that..."
  - 1.7: Learning (Statistics)
- 2: What Do Data Look Like? (Graphs)
  - 2.1: Introduction to Looking at Data (This is what too many numbers looks like)
  - 2.2: Frequency Tables
  - 2.3: APA Style Tables
  - 2.4: Graphing Qualitative Variables- Bar Graphs
  - 2.5: Graphing Qualitative Variables- Pie Charts
  - 2.6: Graphing Quantitative Variables
  - 2.7: Skew and Kurtosis
  - 2.8: Graphing Quantitative Data- Line Graphs
  - 2.9: Graphing Quantitative Data- Histograms
  - 2.10: Graphing Quantitative Data- Boxplots
  - 2.11: Graphing Quantitative Data- Scatterplots
  - 2.12: Summary and Some Honesty
  - 2.13: APA Style Charts
- 3: Descriptive Statistics
  - 3.1: Introduction to Descriptive Statistics
  - 3.2: Math Refresher
  - 3.3: What is Central Tendency?
    - 3.3.1: Introduction to Measures of Central Tendency
    - 3.3.2: Measures of Central Tendency- Mode
    - 3.3.3: Measures of Central Tendency- Median
    - 3.3.4: Measures of Central Tendency- Mean
    - 3.3.5: Summary of Measures of Central Tendency
  - 3.4: Interpreting All Three Measures of Central Tendency
  - 3.5: Introduction to Measures of Variability
  - 3.6: Introduction to Standard Deviations and Calculations
  - 3.7: Practice SD Formula and Interpretation

- 3.8: Interpreting Standard Deviations
- 3.9: Putting It All Together- SD and 3 M's
- 4: Distributions
  - 4.1: Introduction to Distributions
  - 4.2: Introduction to Probability
  - 4.3: The Binomial Distribution
  - 4.4: The Law of Large Numbers
  - 4.5: Normal Distributions and Probability Distributions
  - 4.6: Sampling Distributions and the Central Limit Theorem
  - 4.7: Putting it All Together
  - 4.8: Summary- The Bigger Picture
- 5: Using z
  - 5.1: Introduction to z-scores
  - 5.2: Calculating z-scores
    - 5.2.1: Practice Calculating z-scores
  - 5.3: Introduction to the z table
    - 5.3.1: Practice Using the z Table
    - 5.3.2: Table of Critical Values of z
  - 5.4: Predicting Amounts
  - 5.5: Summary of z Scores
  - 5.6: The Write-Up
- 6: APA Style
  - 6.1: APA and APA Style
  - 6.2: APA Style Resources
  - 6.3: General Paper Format
  - 6.4: Formatting by Section
  - 6.5: Tables and Figures
  - 6.6: Summary of APA Style

## Unit 2: Mean Differences

- 7: Inferential Statistics and Hypothesis Testing
  - 7.1: Growth Mindset
  - 7.2: Samples and Populations Refresher
    - 7.2.1: Can Samples Predict Populations?
    - 7.2.2: Descriptive versus Inferential Statistics
  - 7.3: The Research Hypothesis and the Null Hypothesis
  - 7.4: Null Hypothesis Significance Testing
  - 7.5: Critical Values, p-values, and Significance
    - 7.5.1: Critical Values
    - 7.5.2: Summary of p-values and NHST
  - 7.6: Steps of the Hypothesis Testing Process
  - 7.7: The Two Errors in Null Hypothesis Significance Testing
    - 7.7.1: Power and Sample Size
    - 7.7.2: The p-value of a Test
- 8: One Sample t-test
  - 8.1: Predicting a Population Mean
  - 8.2: Introduction to One-Sample t-tests
  - 8.3: One-Sample t-test Calculations

- 8.3.1: Table of Critical t-scores
- 8.4: Reporting Results
  - 8.4.1: Descriptive and Inferential Calculations and Conclusion Example
- 8.5: Confidence Intervals
  - 8.5.1: Practice with Confidence Interval Calculations
- 9: Independent Samples t-test
  - 9.1: Introduction to Independent Samples t-test
    - 9.1.1: Another way to introduce independent sample t-tests...
  - 9.2: Independent Samples t-test Equation
  - 9.3: Hypotheses with Two Samples
  - 9.4: Practice! Movies and Mood
    - 9.4.1: More Practice! Growth Mindset
  - 9.5: When to NOT use the Independent Samples t-test
    - 9.5.1: Non-Parametric Independent Sample t-Test
- 10: Dependent Samples t-test
  - 10.1: Introduction to Dependent Samples
  - 10.2: Dependent Sample t-test Calculations
  - 10.3: Practice! Job Satisfaction
    - 10.3.1: More Practice! Changes in Mindset
  - 10.4: Non-Parametric Analysis of Dependent Samples
  - 10.5: Choosing Which Statistic- t-test Edition
- 11: BG ANOVA
  - 11.1: Why ANOVA?
    - 11.1.1: Observing and Interpreting Variability
    - 11.1.2: Ratio of Variability
  - 11.2: Introduction to ANOVA's Sum of Squares
    - 11.2.1: Summary of ANOVA Summary Table
  - 11.3: Hypotheses in ANOVA
  - 11.4: Practice with Job Applicants
    - 11.4.1: Table of Critical F-Scores
  - 11.5: Introduction to Pairwise Comparisons
    - 11.5.1: Pairwise Comparison Post Hoc Tests for Critical Values of Mean Differences
  - 11.6: Practice on Mindset Data
  - 11.7: On the Relationship Between ANOVA and the Student t Test
  - 11.8: Non-Parametric Analysis Between Multiple Groups
- 12: RM ANOVA
  - 12.1: Introduction to Repeated Measures ANOVA
    - 12.1.1: Things Worth Knowing About RM ANOVAs
  - 12.2: ANOVA Summary Table
    - 12.2.1: Repeated Measures ANOVA Sum of Squares Formulas
  - 12.3: Practice with RM ANOVA Summary Table
    - 12.3.1: Practice with Mindset
  - 12.4: Non-Parametric RM ANOVA
- 13: Factorial ANOVA (Two-Way)
  - 13.1: Introduction to Factorial Designs
    - 13.1.1: Factorial Notations and Square Tables

- 13.2: Introduction to Main Effects and Interactions
  - 13.2.1: Example with Main Effects and Interactions
  - 13.2.2: Graphing Main Effects and Interactions
  - 13.2.3: Interpreting Main Effects and Interactions in Graphs
  - 13.2.4: Interpreting Interactions- Do Main Effects Matter?
  - 13.2.5: Interpreting Beyond 2x2 in Graphs
- 13.3: Two-Way ANOVA Summary Table
  - 13.3.1: Calculating Sum of Squares for the Factorial ANOVA Summary Table
- 13.4: When Should You Conduct Post-Hoc Pairwise Comparisons?
- 13.5: Practice with a 2x2 Factorial Design- Attention
  - 13.5.1: Practice 2x3 Factorial ANOVA on Mindset
- 13.6: Choosing the Correct Analysis- Mean Comparison Edition

## Unit 3: Relationships

- 14: Correlations
  - 14.1: Refresh to Prepare
  - 14.2: What do Two Quantitative Variables Look Like?
    - 14.2.1: Introduction to Pearson's  $r$
  - 14.3: Correlation versus Causation
    - 14.3.1: Correlation versus Causation in Graphs
  - 14.4: Strength, Direction, and Linearity
  - 14.5: Hypotheses
  - 14.6: Correlation Formula- Covariance Divided by Variability
  - 14.7: Practice on Anxiety and Depression
    - 14.7.1: Table of Critical Values of  $r$
    - 14.7.2: Practice on Nutrition
  - 14.8: Alternatives to Pearson's Correlation
  - 14.9: Final Considerations
- 15: Regression
  - 15.1: Introduction- Line of Best Fit
  - 15.2: Regression Line Equation
    - 15.2.1: Using Linear Equations
  - 15.3: Hypothesis Testing- Slope to ANOVAs
  - 15.4: Practice Regression of Health and Happiness
    - 15.4.1: Practice with Nutrition
  - 15.5: Multiple Regression
- 16: Chi-Square
  - 16.1: Introduction to Chi-Square
    - 16.1.1: Assumptions of the Test(s)
  - 16.2: Introduction to Goodness-of-Fit Chi-Square
    - 16.2.1: Critical Values of Chi-Square Table
    - 16.2.2: Interpretation of the Chi-Square Goodness-of-Fit Test
  - 16.3: Goodness of Fit  $\chi^2$  Formula
  - 16.4: Practice Goodness of Fit- Pineapple on Pizza
  - 16.5: Introduction to Test of Independence
  - 16.6: Practice Chi-Square Test of Independence- College Sports
    - 16.6.1: Practice- Fast Food Meals

- [16.7: RM Chi-Square- The McNemar Test](#)
- [16.8: Choosing the Correct Test- Chi-Square Edition](#)

## Unit 4: Wrap Up

- [17: Wrap Up](#)
  - [17.1: Introduction to Wrapping Up](#)
  - [17.2: Choosing the Test](#)
  - [17.3: Why did you take this class?](#)

[Common Formulas](#)

[Common Critical Value Tables](#)

[Index](#)

[Glossary](#)

[Detailed Licensing](#)