CourseKata

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Topics Covered Aligned with Data Science I (AB)

- 1. Probability
 - a. Law of large numbers (chapters 2, 3, 4)
 - b. Sampling with and without replacement (2, 3)
 - c. Contingency tables (2, 3, 4)
- 2. Research methods
 - a. Sampling (2, 3, 4)
 - b. Measurement: categorical v. quantitative variables (2)
 - c. Organizing data (2)
 - d. Research design: correlational v. experimental (4)
 - e. Correlation, causality, and confounding (4, 7, 8)
- 3. Descriptive statistics
 - a. Univariate visualizations: histograms, box plots, bar graphs (3)
 - b. Bivariate visualizations: frequency tables, faceted histograms, scatterplots, bar graphs, box plots (4)
 - c. Summary statistics:
 - i. center (mean, median, mode) (3, 5)
 - ii. shape (skew, normal, uniform, multimodal) (3, 5)
 - iii. spread (standard deviation, sums of squares, variance) (3, 5, 6)
 - iv. five number summary (3)
 - v. regression, correlation coefficient (8)
 - d. Quantitative and categorical predictors; quantitative outcomes (2)
 - e. Z score (6)
- 4. Inferential statistics and sampling distributions
 - a. Mathematical distributions
 - i. Probability under mathematical distributions (6)
 - ii. normal/Z distribution, t distribution, F distribution (6)
 - b. Computational techniques
 - i. Simulation (2, 4, 6)
 - ii. Bootstrapping (3)
 - iii. Randomization (4)
 - c. Hypothesis testing
 - i. ANOVA (7, 8)
 - ii. Regression (8)
 - iii. Type I and Type II error (4)
 - iv. Concepts of power and effect size (7)
- 5. Organizing concepts (throughout textbook)
 - a. Modeling: DATA = MODEL + ERROR
 - b. General linear model; GLM notation
 - c. Data analysis using R

Topics Covered Aligned with Advanced Data Science I (ABC)

- 1. Probability
 - a. Law of large numbers (chapters 2, 3, 4, 9, 10, 11)
 - b. Sampling with and without replacement (2, 3)
 - c. Contingency tables (2, 3, 4)
- 2. Research methods
 - a. Sampling (2, 3, 4)
 - b. Measurement: categorical v. quantitative variables (2)
 - c. Organizing data (2)
 - d. Research design: correlational v. experimental (4, 9)
 - e. Correlation, causality, and confounding (4, 7, 8, 9, 10)
- 3. Descriptive statistics
 - a. Univariate visualizations: histograms, box plots, bar graphs (3)
 - b. Bivariate visualizations: frequency tables, faceted histograms, scatterplots, bar graphs, box plots (4)
 - c. Summary statistics:
 - i. center (mean, median, mode) (3, 5)
 - ii. shape (skew, normal, uniform, multimodal) (3, 5)
 - iii. spread (standard deviation, sums of squares, variance) (3, 5, 6)
 - iv. five number summary (3)
 - v. regression, correlation coefficient (8)
 - d. Quantitative and categorical predictors; quantitative outcomes (2)
 - e. Z score (6)
- 4. Inferential statistics and sampling distributions
 - a. Mathematical distributions
 - i. Probability under mathematical distributions (6, 9, 10, 11)
 - ii. Central limit theorem (9)
 - iii. normal/Z distribution, t distribution, F distribution (6, 9, 10, 11)
 - b. Computational techniques
 - i. Simulation (2, 4, 6, 9, 10, 11)
 - ii. Bootstrapping (3, 9, 10, 11)
 - iii. Randomization (4, 9, 10, 11)
 - c. Hypothesis testing
 - i. t-test (9)
 - ii. ANOVA (7, 8, 10)
 - iii. Regression (8, 10)
 - iv. Type I and Type II error (4, 10, 11)
 - v. Concepts of power and effect size (7, 10, 11)
 - d. Confidence intervals (11)
- 5. Organizing concepts (throughout textbook)
 - a. Modeling: DATA = MODEL + ERROR
 - b. General linear model; GLM notation
 - c. Data analysis using R

Topics Covered Aligned with Statistics and Data Science II (XCD)

- 1. Probability
 - a. Law of large numbers (chapters 4, 5, 6)
 - b. Sampling with and without replacement (4, 5, 6)
 - c. Contingency tables (1, 2)
- 2. Research methods
 - a. Sampling (1, 2, 4, 5, 6)
 - b. Measurement: categorical v. quantitative variables (1)
 - c. Organizing data (1)
 - d. Research design: correlational v. experimental (2, 3)
 - e. Correlation, causality, and confounding (2, 3, 4, 5, 6, 7, 8)
- 3. Descriptive statistics
 - a. Univariate visualizations: histograms, box plots, bar graphs (1)
 - b. Bivariate visualizations: frequency tables, faceted histograms, scatterplots, bar graphs, box plots (2, 7)
 - c. Summary statistics:
 - i. center (mean, median, mode) (1, 2)
 - ii. shape (skew, normal, uniform, multimodal) (1)
 - iii. spread (standard deviation, sums of squares, variance) (1, 2, 3)
 - iv. five number summary (1)
 - v. regression, correlation coefficient (3)
 - d. Quantitative and categorical predictors; quantitative outcomes (2, 3)
 - e. Z score (covered in AB)
- 4. Inferential statistics and sampling distributions
 - a. Mathematical distributions
 - i. Probability under mathematical distributions (4, 5, 6)
 - ii. Central limit theorem (4)
 - iii. normal/Z distribution, t distribution, F distribution (4, 5, 6)
 - b. Computational techniques
 - i. Simulation (4, 5, 6, 7, 8)
 - ii. Bootstrapping (6, 7, 8)
 - iii. Randomization (4, 5, 6, 7, 8)
 - c. Hypothesis testing
 - i. t-test (4)
 - ii. ANOVA (3, 4, 5)
 - iii. Regression (3, 4, 5)
 - iv. Type I and Type II error (4, 5, 6)
 - v. Concepts of power and effect size (3, 4, 5, 6)
 - d. Confidence intervals (7)
- 5. Organizing concepts (throughout textbook)
 - a. Modeling: DATA = MODEL + ERROR
 - b. General linear model; GLM notation
 - c. Data analysis using R