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Walter Payton College Prep
AP Statistics Course Outline 2014- 2015
Textbook: Introduction to Statistics and Data Analysis (Peck, Olsen, Devore, 2008)

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Quarter 1: Descriptive Statistics & Regression

Topics:
1. Introduction to Statistics (Chapters 1& 2)
   - Why we study statistics
   - Types of data and its sources (i.e. types of studies)
   - Collection methods
   - Sources and ramifications of bias
   - Comparative Experiments

2. Describing Data: (Chapters 3 & 4)
   1. Graphical Methods for Describing Data (Chapter 3)
      - Categorical Data (Frequency distributions, pie and bar charts)
      - Quantitative Data (Dot plots, stem plots, frequency distributions, and histograms)
   2. Numerical Methods for Describing Data (Chapter 4)
      - Center (Mean, Median, mode)
      - Variability (standard deviation, range, IQR); define outliers
      - Outliers effects on measures of center and variability (resistance)
      - Graphical summary of quantitative data via box plots
      - Interpreting Center and Variability (Empirical Rule, Standardized (z) scores)
      - Synthesizing written analysis of distributions.

3. Summarizing Bivariate Data (Chapter 5)
   - Graphical analysis via a scatterplot
   - Correlation (calculation and interpretation)
   - Generating the Least Squares Regression Line for linearly related data and assessing the fit of that line
   - Transformations of data when relationship is nonlinear
   - Synthesizing written analysis of bivariate relationships.

   Major projects/assessments:
   - Ch. 1 & 2 Test, Ch. 3 & 4 Tests
   - Abstract Writing & Evaluation (in-class, pairs assignment)
   - Various written reflections on study design & bias

Quarter 2: Regression (con't.), Elementary Probability

Topics:
4. Elementary Probability (Chapter 6)
   - Elementary Probability
   - Chance experiments and events
   - Basic properties of probability (addition and multiplication rules)
   - Conditional probability and Independence

- Probability Rules generalized

5. Random Variables and Probability Distributions (Chapter 7)
   - Random variables defined (discrete v. continuous)
   - Distribution of discrete and continuous random variables
   - Summarizing distributions center (mean) and variability (standard deviation)
   - Binomial and geometric probability and distributions
   - Normal distributions (bringing in standardized (z) scores)
   - Checking for normality of distributions via the normal probability plot
   - Probability estimation using empiricism and simulation (using random number tables and random number generator)

Quarter 3: Sampling Distributions and Statistical Inference

6. Sampling Distributions (Chapter 8)
   - Sampling Variability
   - Sampling distributions of sample means and proportions

7. One Sample Estimation (Chapter 9)
   - Define point estimation (Confidence Intervals)
   - Large sample confidence intervals for a population proportion and mean via the z-distribution
   - Interpreting results of confidence intervals and synthesizing written analysis.

8. Inference/Hypothesis Testing using One Sample (Chapter 10)
   - Formulating hypotheses
   - Test procedures, conditions and assumptions
   - Errors (type 1 and 2) in hypothesis testing and how they related to significance level set for each test
   - Large sample hypothesis test for population proportion and mean
   - Power of hypothesis test
   - Probability of type 2 error
   - Interpreting results of one sample hypothesis tests and synthesizing written analysis.

9. Inference/Hypothesis Testing using Two Samples (Chapter 11)
   - Reasons for two samples: comparing two populations or two treatments (relate to type of study and experimental design)
   - Hypothesis test concerning the difference in *means* for two populations or treatments using *independent* samples
   - Hypothesis test concerning the difference in *means* for two populations or treatments using *paired* samples
   - Large sample inference concerning a difference between two population or treatment *proportions*.
   - Define assumptions of each hypothesis test and check for conditions necessary for the validity of the test
   - Interpreting results of two sample hypothesis tests and synthesizing written analysis.

10. Analysis of Categorical Data (Chapter 12)
    - Goodness-of-Fit test for univariate categorical data and the chi-squared distribution
    - Characteristics of chi-squared distribution

- Chi-squared tests for bivariate categorical data (homogeneity and independence) in a two-way table
- Interpreting results of chi-squared hypothesis tests and synthesizing written analysis.

11. Inference on Slope of Least Squares Regression Line (Chapter 13)
   - Review of least squares regression analysis
   - Inference concerning slope of LSRL (and review of sampling distributions of slope)
   - Assessing the model's adequacy via residuals, coefficient of determination, and standard deviation of errors and slope.
   - Interpreting results of hypothesis tests for slope and synthesizing written analysis.

Quarter 4: AP Prep & ANOVA